



May 30, 2023

NCDOT STIP Project U-5307 (Capital Boulevard) Freeway Upgrade

Environmental Assessment



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U.S. 1 (Capital Boulevard) Freeway Upgrade

From I-540 in Raleigh to SR 1909 (Purnell Road)/SR 1931 (Harris Road) in Wake Forest

Wake County, North Carolina

Federal Aid Project No. NHS-0001 (138)

NCDOT STIP Project No. U-5307

WBS No. 47027.1.1

Administrative Action

Environmental Assessment

Submitted Pursuant to the National Environmental Policy Act 42 U.S.C 4332(2)(c)

By the

United States Department of Transportation, Federal Highway Administration;

North Carolina Department of Transportation

Date of Approval

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Table of Contents

1	Summary of the Proposed Project	1
1.1	Introduction.....	1
1.2	Project Vicinity and History.....	1
1.3	Description of Project.....	3
1.4	U-5307 and the NEPA/404 Merger Process.....	5
1.5	Cost Estimates	6
2	Need and Purpose	7
2.1	Need for the Project.....	7
2.1.1	Traffic Congestion.....	7
2.1.2	Trip Time Unreliability.....	11
2.2	Purpose of the Project.....	13
2.3	Supporting Information.....	13
2.3.1	Existing Conditions	13
2.3.2	Secondary Benefits of the Project.....	14
3	Alternatives.....	15
3.1	Preliminary Study Alternatives	15
3.1.1	No-Build Alternative.....	15
3.1.2	Alternative Modes of Travel.....	15
3.2	Build Alternatives.....	15
3.2.1	Design Criteria.....	16
3.2.2	Design Alternatives (by Interchange/Intersection Location).....	17
3.2.3	Alternatives Comparison.....	22
3.2.4	Alternatives Considered but Eliminated	24
3.2.5	Alternatives Carried Forward.....	25
3.2.6	NCDOT Recommended Alternatives.....	38
3.2.7	Traffic Operations Analysis and Number of Lanes.....	38
4	Proposed Improvements	41
4.1	Roadway Typical Sections.....	41
4.1.1	U.S. 1.....	41

4.1.2	Service/Connector Roads	42
4.2	Right-of-Way	42
4.3	Access Control.....	42
4.4	Design Speed and Speed Limit.....	42
4.5	Anticipated Design Exceptions	43
4.6	Structures/Bridging Decisions.....	44
4.6.1	Drainage Structures.....	44
4.6.2	Non-Drainage Structures.....	45
4.7	Interchanges/Grade Separations.....	45
4.8	Service/Connector Roads	46
4.9	Railroad Involvement	47
4.10	Work Zone Traffic Control and Construction Phasing.....	48
4.11	Bicycle and Pedestrian Facilities	48
4.12	Utilities.....	48
4.13	Landscaping	48
5	Environmental Effects of Proposed Action	49
5.1	Natural Resources	49
5.1.1	Physical Resources.....	49
5.1.2	Biotic Resources.....	51
5.1.3	Jurisdictional Issues	53
5.1.4	Cultural Resources	59
5.1.5	Section 4(f)/6(f) Resources	61
5.1.6	Community Resources.....	62
5.1.7	Business and Economic Effects.....	69
5.1.8	Indirect and Cumulative Effects.....	70
5.1.9	Land Use.....	70
5.1.10	Traffic Noise	77
5.1.11	Air Quality	83
5.1.12	Hazardous Materials.....	85
5.1.13	Flood Hazard Evaluation.....	89

5.1.14 Overall Impact Summary 90

6 Public Involvement, Agency, and Municipal Coordination..... 94

6.1 Public Meetings, Public Hearing, & Neighborhood Meetings..... 94

6.1.1 Public Meeting 1 (October 2018)..... 94

6.1.2 Public Meeting 2 (December 2021) 94

6.1.3 Circle Drive Neighborhood Meeting (November 2022) 95

6.1.4 Small Group Meetings..... 95

6.1.5 Municipal Coordination Meetings..... 96

6.1.6 Public Hearing 97

6.2 Online Outreach Efforts..... 97

6.2.1 Project Website 97

6.2.2 Phone and Mail Contacts..... 97

6.2.3 Phone Hotline..... 97

6.2.4 Postcards/Newsletter 97

6.3 NEPA/404 Merger Process 98

6.3.1 Concurrence Point 1 – Purpose and Need, Study Area Defined (June 2018)..... 98

6.3.2 Concurrence Point 2 – Detailed Study Alternatives Carried Forward (November 2018, April 2021)..... 99

6.3.3 Concurrence Point 2A – Bridging Decisions and Alignment Review (November 2021) 101

6.3.4 Concurrence Informational Meeting (December 2022) 102

6.3.5 Concurrence Point 3 – LEDPA/Preferred Alternative Selection 102

6.3.6 Concurrence Point 4A – Avoidance and Minimization..... 102

List of Tables

Table 1-1. U-5307 Project Cost Estimates 6

Table 2-1. Roadway Segment Crash Type Summary (June 1, 2011 - May 31, 2016)..... 14

Table 3-1. U.S. 1 Future (2040) Travel Time Comparison 16

Table 3-2. Comparison of Build (2040) Options..... 22

Table 3-3. Interchange Concepts Considered but Eliminated..... 24

Table 3-4. Interchange Alternatives Carried Forward for Additional Analysis 25

Table 3-5. Current NCDOT Recommended Alternatives..... 38

Table 3-6. LOS D Thresholds for U-5307 Basic Freeway Segments..... 39

Table 3-7. Project Life Expectancy Based on 2040 Build Volumes, LOS Threshold of Basic Freeway Segments, and Geometric Design Requirements..... 40

Table 4-1. Anticipated Design Exceptions..... 43

Table 4-2. Recommended Drainage Structures from Concurrence Point 2A 44

Table 4-3. Service/Connector Roads (Existing and Proposed) 46

Table 5-1. Coverage of Terrestrial Communities in the Study Area 51

Table 5-2. Federally Protected Species Listed for Wake County 57

Table 5-3. Historical Architectural Resources and Effects..... 59

Table 5-4. Section 4(f) Resources and Impact Determinations..... 61

Table 5-5. Anticipated Relocation Impacts by Project Segment (per June 2021 Relocation Report) 65

Table 5-6. Predicted Traffic Noise Impacts by Alternatives..... 78

Table 5-7. Predicted Traffic Noise Contour Distances..... 78

Table 5-8. Preliminary Noise Barrier Evaluation Results 79

Table 5-9. Flood Hazard Sites Requiring Additional FEMA Coordination..... 89

Table 5-10. Segment A Overall Impacts Summary..... 91

Table 5-11. Segment B Overall Impacts Summary 92

Table 5-12. Segment C Overall Impacts Summary..... 93

Table 5-13. Segment D Overall Impacts Summary 93

Table 6-1. Proposed Interchange Alternatives from CP 2 (Agreed to by Merger Team in 2019) 99

Table 6-2. Proposed Interchange Alternatives from CP 2 Revised (Agreed to by Merger Team in 2021) 100

Table 6-3. Bridging Decisions from CP 2A 101

List of Figures

Figure 1-1. U-5307 Project Segmentation.....4

Figure 5-1. Natural Resources 50

Figure 5-2. Terrestrial Communities within the Project Study Area 52

Figure 5-3. Potential Jurisdictional Resources within the Project Study Area..... 54

Figure 5-4. Cultural Resources..... 60

Figure 5-5. Notable Human Environment and Community Resources..... 64

Figure 5-6. LUSA Future Land Use Study Area 71

Figure 5-7. GeoEnvironmental Sites of Concern (Figure 1 of 3 from Phase I Report)..... 86

Figure 5-8. GeoEnvironmental Sites of Concern (Figure 2 of 3 from Phase I Report)..... 87

Figure 5-9. GeoEnvironmental Sites of Concern (Figure 3 of 3 from Phase I Report)..... 88

List of Exhibits

Exhibit 2-1. Traffic Forecast Daily Volumes– 2015 (Existing Conditions) and 2040 (No Build)..... 7

Exhibit 2-2. Existing Traffic Conditions Photos 8

Exhibit 2-3. 2015 Planning Time Index for U.S. 1 (Capital Boulevard) from I-540 to north of N.C. 98 Business) 11

Exhibit 2-4. September 2015 Actual(Average) Speed (mph) for U.S. 1 (Capital Boulevard) Southbound..... 12

Exhibit 2-5. September 2015 Average Speed (mph) for U.S. 1 (Capital Boulevard) Northbound..... 12

Exhibit 3-1. U.S. 1 Typical Section..... 16

Exhibit 3-2. I-540 at U.S. 1 Interchange Design Concepts 17

Exhibit 3-3. Durant Road/Perry Creek Road at U.S. 1 Interchange Design Concepts..... 18

Exhibit 3-4. Burlington Mills Road at U.S. 1 Interchange Design Concepts..... 19

Exhibit 3-5. Falls of Neuse Road/U.S. 1A (South Main Street) Interchange Design Concepts..... 20

Exhibit 3-6. Purnell Road/Harris Road at U.S. 1 Interchange Design Concepts..... 21

Exhibit 3-7. Preliminary I-540 at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023)..... 26

Exhibit 3-8. Preliminary Durant Road/Perry Creek Road at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023) 27

Exhibit 3-9. Preliminary Burlington Mills Road at U.S. 1 Interchange Designs to be Presented at the Public Hearing (June 2023)..... 28

Exhibit 3-10. Preliminary Falls of Neuse Road/U.S. 1A (South Main Street) at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023).....	29
Exhibit 3-11. Preliminary N.C. 98 Bypass at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023).....	29
Exhibit 3-12. Preliminary N.C. 98 Business at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023).....	30
Exhibit 3-13. Preliminary Purnell Road/Harris Road at U.S. 1 Interchange Designs to be Presented at the Public Hearing (June 2023)	31
Exhibit 3-14. Gresham Lake Road Extension Alternatives to be Presented at the Public Hearing (June 2023)	32
Exhibit 3-15. Gresham Lake Road/Capital Hills Drive/Overlook Road Roundabout Option to be Presented at the Public Hearing (June 2023)	34
Exhibit 3-16. Jenkins Road/Stadium Drive Overpass to be Presented at the Public Hearing (June 2023)	35
Exhibit 3-17. Neuse River Bridging Options to be Presented at the Public Hearing (June 2023)	36
Exhibit 3-18. I-540 Widening Option to be Presented at the Public Hearing (June 2023)	37
Exhibit 4-1. U.S. 1 Proposed Mainline Typical Section	41
Exhibit 4-2. Example Proposed Service/Connector Road Typical Section.....	42
Exhibit 5-1. Indirect Effects Matrix	74
Exhibit 5-2. Land Use Scenario Assessment Matrix.....	76

Appendices

Appendix A – Acronyms

Appendix B – Supplemental Traffic Documentation

Appendix C – Natural Resources Documentation

Appendix D – Cultural Resources Documentation

Appendix E – Relocation Reports

Appendix F – Public Involvement Documentation

Appendix G – NEPA/404 Merger Team Meeting Concurrence Forms

PROJECT COMMITMENTS

Widening of US 1 from I-540 to Franklin County line

T.I.P Number:U-5307

Wake

Federal Aid Number:

WBS:47027.1.1

COMMITMENTS FROM PROJECT DEVELOPMENT AND DESIGN

Hydraulics - Construction in FEMA Floodplain

This project involves construction activities on or adjacent to FEMA-regulated stream(s). Therefore, the Division shall: (1) construct all vertical and horizontal elements within the floodplain as designed; and (2) consult with the Hydraulics Unit of any planned deviation of these elements within the floodplain prior to commencing any such changes; and (3) submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction. The Hydraulics Unit will then verify either: (1) the drainage structure(s) and roadway embankment located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically; or (2) any changes made to the plans were reviewed and approved to meet FEMA SFHA compliance; or (3) appropriate mitigation measures will be achieved prior to project close-out.

EAU – ECAP - Construction Moratorium

The North Carolina Wildlife Resources Commission identifies the Neuse River within the study area as anadromous fish spawning area (AFSA). An in-water work moratorium will apply for this project between February 15 – June 30.

EAU – Cultural Resources - Powell House Historic Property

NCDOT will provide a driveway access to the historic property off Stroller Ridge Drive. NCDOT will purchase/protect the triangular piece of land adjacent to the historic property.

EAU – Cultural Resources - Wakefields / Sutherland Historic Property

NCDOT will construct a soil nail retaining wall along the front of the property with the design being selected by property owner. NCDOT will also coordinate landscaping and fencing (for top of wall) with the property owner. Cul-de-sac of Wake Union Road will be replaced with a t-turn at the property line. Further coordination will be required with HPO regarding archaeological site.

Project Management (PMU/SMU/Division) - U-5307A Design-Build Requirements

The Design-Build team for US1 and Division 5 project team for U-5307 should continue to coordinate roadway design plans.

COMMITMENTS FROM PERMITTING

No commitments developed during project permitting.

*****END OF PROJECT COMMITMENTS*****

Widening of US 1 from I-540 to Franklin County line

47027.1.1

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1 Summary of the Proposed Project

1.1 Introduction

The U-5307 Environmental Assessment has been prepared in accordance with the National Environmental Policy Act (NEPA) and at the direction of the Federal Highway Administration. Additional information regarding the NEPA process and Environmental Assessments is available on FHWA's webpage (<https://www.environment.fhwa.dot.gov/nepa/documentation.aspx>).

The purpose of this document is to summarize the potential environmental impacts and benefits, explain why the project is proposed, outline the multiple alternatives considered throughout the project development process, and document avoidance, minimization, and mitigation measures. This document also includes technical studies and analyses, supporting data, information, and other reports that have been completed since the start of the project. Excerpts from many of these reports are available in the following sections while complete reports can be reviewed in the corresponding Appendices.

Copies of this document are available for review on the U-5307 project page (www.ncdot.gov/projects/capital-boulevard-upgrade) as well as the following locations:

- ❖ NCDOT Division 5 Office – 2612 N. Duke Street, Durham, NC 27704
- ❖ NCDOT Division 5, District 1 Office – 4005 District Drive, Raleigh, NC 27607
- ❖ City of Raleigh, Planning Department – One Exchange Plaza, 219 Fayetteville Street, Suite 300, Raleigh, NC 27601
- ❖ Town of Wake Forest, Planning Department – Wake Forest Town Hall – Third Floor, 301 S Brooks Street, Wake Forest, NC 27587

1.2 Project Vicinity and History

The City of Raleigh (the State Capital) is North Carolina's 2nd largest city, with an estimated population of 462,219¹. The Triangle Region (Raleigh-Durham-Cary Combined Statistical Area) has an estimated population of 2,144,608².

U.S. 1 was named Capital Boulevard because it connects several capitals (Washington, DC to Richmond, VA to Raleigh, N.C. to Columbia, SC). U.S. 1 is a Strategic Transportation Corridor and

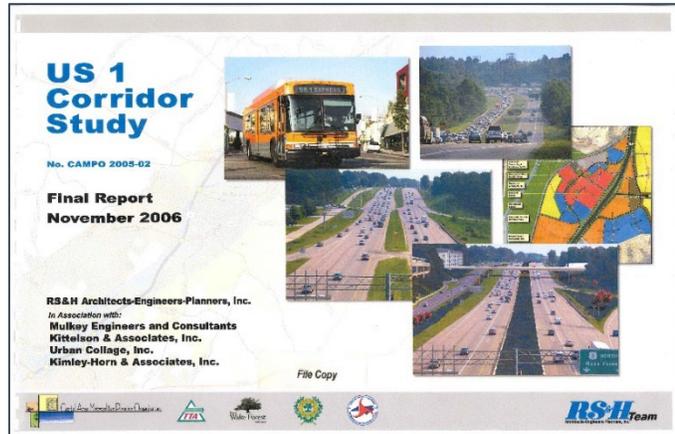
¹ Source: U.S. Census Bureau, [2021 ACS 5-Year Demographic and Housing Estimates](#)

² Source: U.S. Census Bureau, [Metropolitan and Micropolitan Statistical Areas Population Totals and Components of Change: 2020-2021](#)

serves as a principal north/south route for moving people and goods throughout the east coast. It is a major route between Raleigh and major suburban areas, including the Town of Wake Forest.

The Capital Area Metropolitan Planning Organization (CAMPO) has previously initiated several studies along the U.S. 1 corridor, in coordination with the North Carolina Department of Transportation (NCDOT), Wake County, City of Raleigh, GoTriangle (formerly Triangle Transit), the Town of Wake Forest, and several other agencies/municipalities. The corridor studies and updates covered a wider area than is included in the project limits of U-5307, which could possibly be future phases of another project.

CAMPO's previous studies are referred to as Phase I (2006) and Phase II (2012). The Phase I study limits extended from I-540 in Raleigh to U.S. 1A (Park Avenue) in Youngsville. The Phase II study extended the Phase I study from U.S. 1A in Youngsville to the Vance County line.

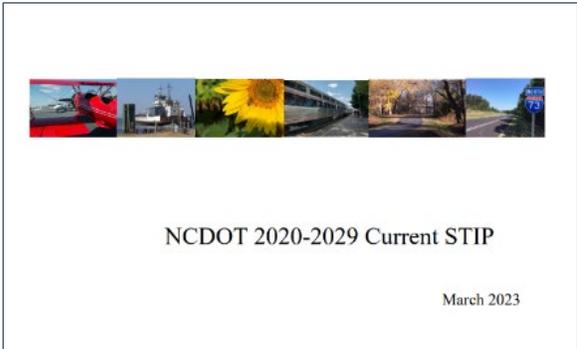


NCDOT State Transportation Improvement Plan (STIP) Project U-5307 is included in the area called Phase I of the Corridor Study. Several updates were completed in 2014 including one to reevaluate the U.S. 1 and Falls of Neuse Road/U.S. 1A (S Main Street) intersection and another to update overall recommendations and service road analyses based on recent development (since 2006). U.S. 1 is a primary north-south corridor serving rapidly growing areas, and the vision and character of the roadway are similar to conditions in 2006 when the first Corridor Study was completed. Much of the work and outreach was included in the efforts to complete these plans and will be referenced and used in ongoing work as needed/appropriate. The Studies recommended bicycle, pedestrian, and transit accommodations on the service roads, which will be considered as U-5307 progresses through the planning and design process.

The typical section recommended in the Corridor Study was a median-divided highway with a transit option and two-way service roads with a turn-lane (as needed) and bicycle/pedestrian accommodations³.

³ For U.S. 1, the Locally Preferred Alternative included three general-purpose lanes in each direction plus auxiliary lanes from I-540 to Falls of Neuse Road/U.S. 1A (S Main Street), one special use HOV or additional general-purpose lane from I-540 to NC 98 (Durham Road), and sufficient right-of-way to accommodate an ultimate eight-lane facility.

The current NCDOT STIP (March 2023) has programmed Segment A as a Design-Build project and includes right-of-way and utility dates in Fiscal Year (FY) 2025 and construction in FY 2025-2028. Segments B and C include right-of-way and utilities in FY 2025 as well but construction beginning in FY 2027. Segment D right-of-way and utilities are included in FY 2029, but construction is unfunded at this time. These dates are likely to change with the upcoming new Draft 2024-2033 STIP.



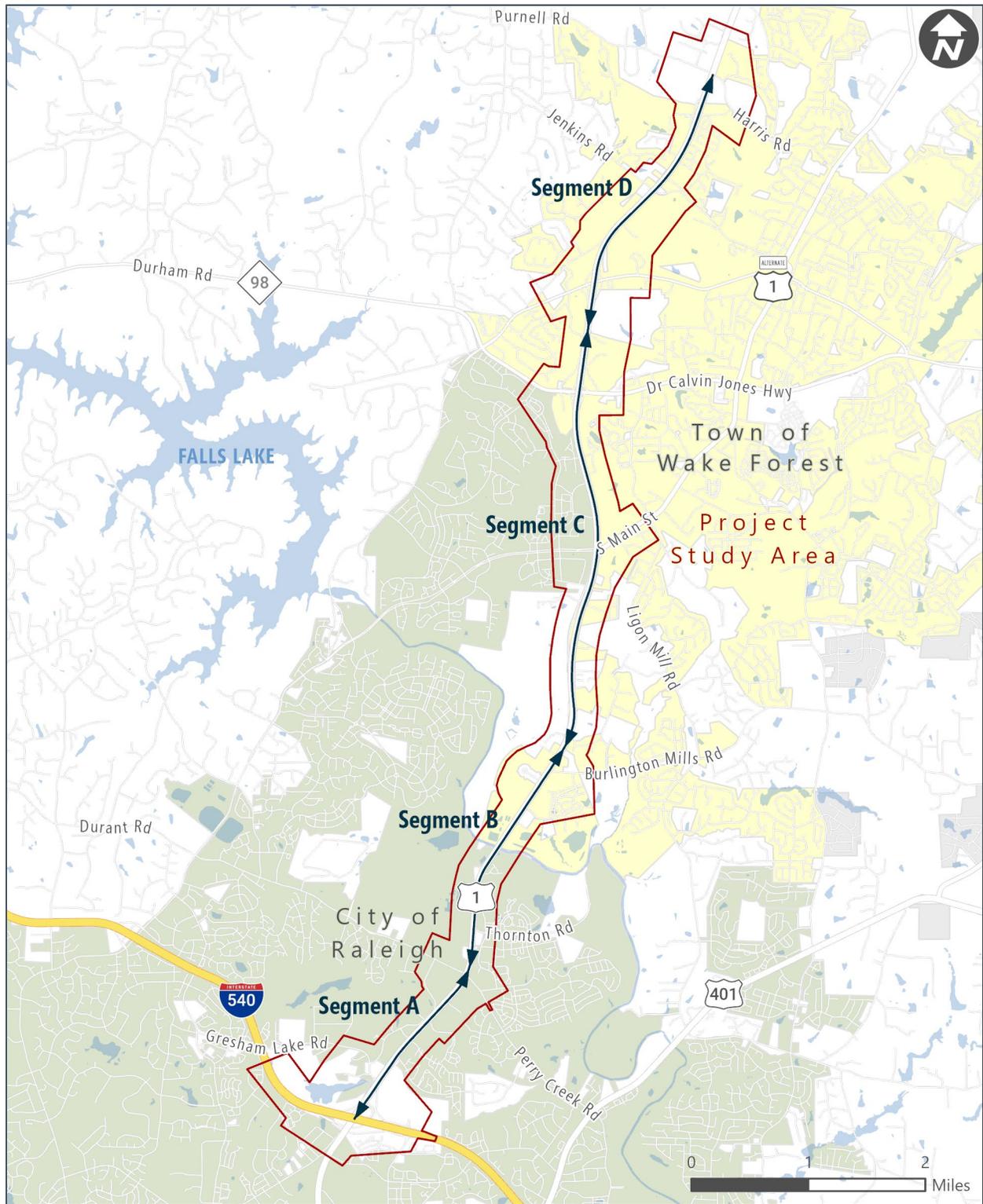
1.3 Description of Project

NCDOT proposes to upgrade approximately 10.5 miles of U.S. 1 from I-540 in Raleigh to SR 1909 (Purnell Road)/SR 1931 (Harris Road) in Wake Forest in Wake County. NCDOT’s current State Transportation Improvement Program includes the U-5307 as four segments, A through D, which can be seen in **Figure 1-1**.

U-5307 Segment Summary

- ❖ Segment A – I-540 to north of Durant Road/Perry Creek Road
- ❖ Segment B – North of Durant Road/Perry Creek to Burlington Mills Road
- ❖ Segment C – North of Burlington Mills Road to south of N.C. 98 Business
- ❖ Segment D – South of N.C. 98 Business to Purnell Road/Harris Road

Figure 1-1. U-5307 Project Segmentation



Proposed improvements include upgrading U.S. 1 from a four-lane, median-divided roadway with partial access control to a fully controlled-access, six-lane plus auxiliary lanes, median divided freeway as well as improving existing and constructing new interchanges and service/connector roads. The current design includes the following:

- ❖ Removing all traffic signals and driveway connections along U.S. 1.
- ❖ Improving existing interchanges along U.S. 1 at I-540, N.C. 98 Bypass, and N.C. 98 Business.
- ❖ Constructing two new grade separations along U.S. 1: north of I-540 at Gresham Lake Road and at the existing Jenkins Road/Stadium Drive intersection.
- ❖ Constructing new interchanges at Durant Road/Perry Creek Road, Burlington Mills Road, U.S. 1A (Falls of Neuse Road/South Main Street), and Purnell Road/Harris Road.
- ❖ Improving existing service/connector roads and constructing new service/connector road connections throughout the project corridor.

1.4 U-5307 and the NEPA/404 Merger Process

Due to the scope of the project and potential impacts, the U-5307 project has been subject to NCDOT's NEPA/404 Merger Process – “[...] a process to streamline the project development and permitting processes, agreed to by the USACE, NCDENR (DWQ, DCM), FHWA and NCDOT and supported by other stakeholder agencies and local units of government. To this effect, the Merger Process provides a forum for appropriate agency representatives to discuss and reach consensus on ways to facilitate meeting the regulatory requirements of Section 404 of the Clean Water Act during the NEPA/SEPA decision-making phase of transportation projects.”⁴

The U-5307 NEPA/404 Merger Team (Merger Team) signatories include U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (USEPA), Federal Highway Administration (FHWA), U.S. Fish and Wildlife Services (USFWS), National Marine Fisheries Service (NMFS), Capital Area Metropolitan Planning Organization (CAMPO), N.C. Department of Cultural Resources (NCDCCR), N.C. Department of Water Resources (NCDWR), N.C. Wildlife Resources Commission (NCWRC), and NCDOT.

⁴ Additional information on the NCDOT NEPA/404 Merger Process can be found at: <https://connect.ncdot.gov/resources/Environmental/EPU/Merger/Pages>

1.5 Cost Estimates

The current NCDOT STIP (March 2023) total (Segments A-D) project cost estimate is \$474.1M.

Table 1-1 includes the current project cost estimates. The cost estimates below reflect a range based on the current alternatives for each segment. For a detailed breakdown of cost by alternative, reference [Section 5.1.14](#).

Table 1-1. U-5307 Project Cost Estimates

Segment	Right-of-Way	Utilities	Construction	Total
Segment A	\$86.2M - \$93.7M	\$16.6M - \$18.9M	\$164.6M - \$182.0M	\$267.4M - \$294.6M
Segment B	\$47.3M - \$74.6M	\$7.1M - \$8.8M	\$93.2M - \$101.9M	\$147.6M - \$185.3
Segment C	\$28.1M	\$6.5M	\$128.6M	\$163.3M
Segment D	\$48.0M - \$48.4M	\$9.0M - \$9.1M	\$109.0M - \$110.3M	\$166.1M - \$167.7M
TOTAL				\$744.4M - \$810.9M

Note – Cost estimates are rounded to the nearest \$0.1M.

2 Need and Purpose

2.1 Need for the Project

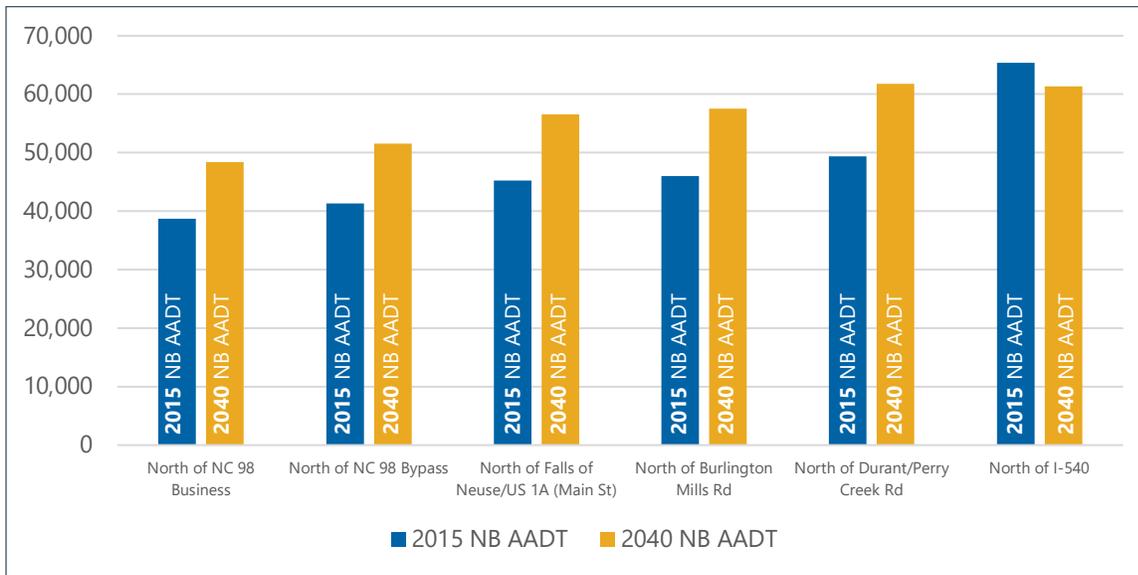
The overall need for this project is:

- ❖ Traffic congestion and trip time unreliability.

2.1.1 Traffic Congestion

The *U-5307 Combined Traffic Forecast Report (Volume I & II)* for existing (2015) and future (2040) No Build and Build conditions was approved in June 2017. Current (2015) volumes along U.S. 1 range from approximately 40,000 vehicles per day (vpd) north of N.C. 98 Business (Durham Highway) to 65,000 vpd near I-540. Future (2040) projected volumes (No Build scenario) could range from 50,000 vpd north of N.C. 98 Business to more than 80,000 vpd near I-540. These volumes are portrayed in **Exhibit 2-1**. Additional details are available in **Appendix B**.

Exhibit 2-1. Traffic Forecast Daily Volumes– 2015 (Existing Conditions) and 2040 (No Build)



Forecasted traffic volumes in the 2040 Build conditions scenario range from approximately 55,000 vpd north of the interchange at Harris and Purnell Road to more than 100,000 vpd on U.S. 1 near I-540. This is primarily due to the increase in capacity afforded to the corridor by converting U.S. 1 to a freeway.

Exhibit 2-2. Existing Traffic Conditions Photos



U.S. 1 (Capital Boulevard) Southbound Approaching I-540



U.S. 1 (Capital Boulevard) Southbound at Capital Hills Connector



U.S. 1 (Capital Boulevard) Southbound Approaching I-540



U.S. 1 (Capital Boulevard) Southbound at Capital Hills Connector



U.S. 1 (Capital Boulevard) Southbound Approaching I-540



U.S. 1 (Capital Boulevard) Southbound at Capital Hills Connector



U.S. 1 (Capital Boulevard) Northbound Approaching Neuse River



U.S. 1 (Capital Boulevard) Northbound North of Neuse River



U.S. 1 (Capital Boulevard) Southbound Approaching Shearon Farms Avenue



U.S. 1 (Capital Boulevard) Northbound at Burlington Mills Road



U.S. 1 (Capital Boulevard) Northbound at Falls of Neuse Road/U.S. 1A (South Main Street)



U.S. 1 (Capital Boulevard) Southbound at Falls of Neuse Road/U.S. 1A (South Main Street)



U.S. 1 (Capital Boulevard) Southbound Approaching Caveness Farms Avenue/Corona Boulevard



U.S. 1 (Capital Boulevard) Southbound Approaching N.C. 98 Business Interchange



U.S. 1 (Capital Boulevard) Southbound Approaching N.C. 98 Bypass interchange



U.S. 1 (Capital Boulevard) Northbound at Harris Road



GoTriangle Bus on U.S. 1 (Capital Boulevard)



Traffic along U.S. 1 (Capital Boulevard)

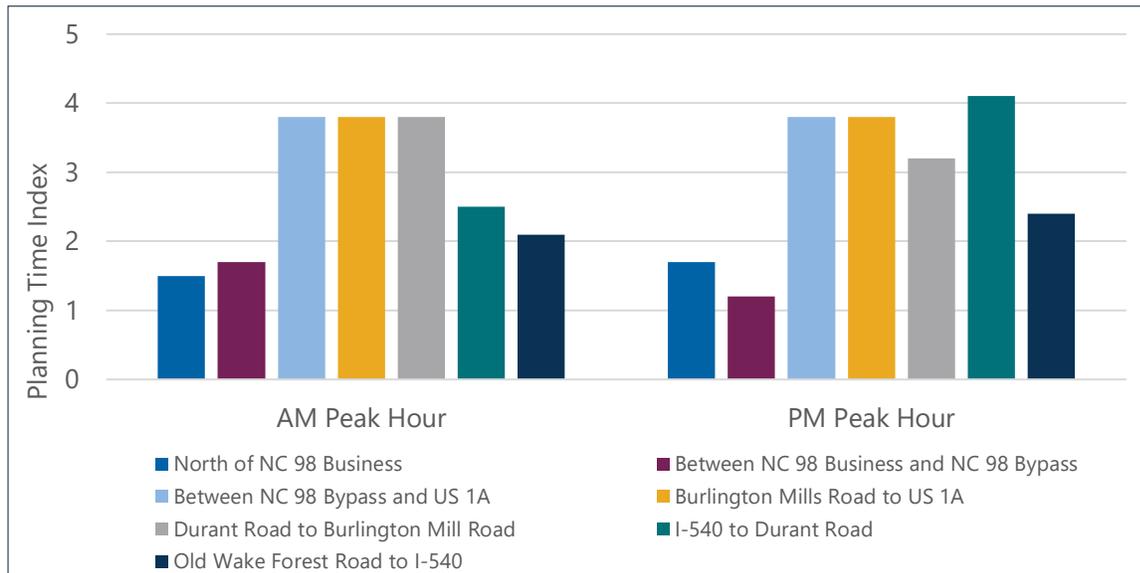
The *U-5307 Traffic Operations Report* for existing and future (2040) No Build conditions from I-540 to N.C. 98 Bypass was approved in January 2017. The *U-5307 Traffic Operations Report* for existing and future (2040) No Build conditions for the entire project study area, including the extended project area (N.C. 98 Bypass to Harris/Purnell Road) was completed in April 2018.

Congestion along U.S. 1 for the 2040 No Build condition is anticipated to increase greatly from the 2015 Existing condition, showing that the current capacity of the existing roadway configuration would not be able to accommodate the future volumes.

2.1.2 Trip Time Unreliability

Trip times along U.S. 1 are highly variable, making it difficult for drivers to plan trips. A trip in the PM peak on at least one segment of the U-5307 corridor can take up to four times longer than regular trips (non-peak times). Planning Time Index (**Exhibit 2-3**) is the ratio of the 95th percentile travel time of a given period compared to the time required to make the same trip at free-flow speeds. A value of 2, for example, means that a 15-minute free flow trip requires 30 minutes during the peak. (The average non-peak trip through the project study area usually takes approximately 15 minutes.)

Exhibit 2-3. 2015 Planning Time Index for U.S. 1 (Capital Boulevard) from I-540 to north of N.C. 98 Business)



The 2040 No Build condition travel time analysis indicates that travel times during the AM and PM peak hours for 14 miles along U.S. 1 would be 33 and 34 minutes, respectively (both for the southbound direction, which is the most congested). This converts to an average speed of approximately 25 miles per hour (mph). Similarly, in the northbound direction, travel times in both AM and PM peak hours are anticipated to increase by approximately 30 percent between 2015 and 2040 if no improvements are made.

Speed tables based on 2015 INRIX⁵ data (**Exhibit 2-4 and Exhibit 2-5**) show slowdowns in both directions during both the AM and PM peak hours. The currently posted speed limit along U.S. 1 is 55 mph.

Exhibit 2-4. September 2015 Actual (Average) Speed (mph) for U.S. 1 (Capital Boulevard) Southbound

Location	Length (Miles)	Time										
		6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
NC 98 Bypass Interchange	0.65	58.5	45.8	57.3	60.0	59.2	59.7	59.3	57.4	59.4	58.2	57.9
North of Falls of Neuse Rd/US 1 Alt (S. Main St)	1.07	43.5	24.7	39.8	40.5	40.3	41.0	39.7	38.4	39.8	44.2	44.4
Falls of Neuse Rd/US 1 Alt (S. Main St) Intersection	0.02	36.4	26.2	30.3	28.1	26.3	30.2	28.8	30.9	29.7	33.5	29.4
North of Burlington Mills Rd	1.94	52.2	29.1	33.0	49.3	51.1	47.1	49.2	47.8	49.8	51.2	52.1
North of Perry Creek Rd/Durant Rd	1.94	47.5	22.1	21.7	40.4	45.7	42.8	41.9	42.3	45.6	46.4	46.4
Perry Creek Rd/Durant Rd Intersection	0.02	40.1	27.9	28.8	29.8	31.0	28.5	32.9	33.5	32.4	32.3	31.1
North of I-540	1.28	45.1	38.8	37.1	42.1	42.4	37.6	39.1	39.6	39.8	40.5	42.9

Exhibit 2-5. September 2015 Average Speed (mph) for U.S. 1 (Capital Boulevard) Northbound

Location	Length (Miles)	Time										
		6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM
I-540 Interchange	0.55	43.6	43.3	40.2	44.0	46.8	39.8	37.7	33.4	35.5	45.9	45.5
South of Perry Creek Rd/Durant Rd	1.12	46.2	39.4	38.3	39.8	42.9	26.4	24.1	21.7	21.0	40.4	42.3
Perry Creek Rd/Durant Rd Intersection	0.02	32.1	27.1	25.2	21.9	24.0	24.2	23.7	22.1	22.9	23.8	26.1
South of Burlington Mills Rd	1.94	48.1	43.0	43.2	43.8	46.4	35.7	33.0	28.0	34.4	43.0	46.2
South of Falls of Neuse Rd/US 1 Alt (S. Main St)	1.92	49.9	48.1	46.0	48.4	47.9	45.5	45.4	42.5	46.1	47.4	48.6
Falls of Neuse Rd/US 1 Alt (S. Main St) Intersection	0.06	34.3	34.6	28.0	26.4	19.0	26.9	25.7	23.0	28.4	22.7	22.8
South of NC 98 Bypass	1.12	50.9	51.2	50.2	49.4	49.5	49.3	50.4	48.7	50.6	48.0	46.5

Legend – U.S. 1 Speeds



⁵ INRIX is a company that provides real-time traffic data using GPS-enabled devices, cell phones, and road sensors allowing users to map and understand travel times and congestion. For more information, visit www.inrix.com.

2.2 Purpose of the Project

To address the needs described previously, the purpose of the proposed project is to:

- ❖ Improve traffic congestion and travel times.
- ❖ Maintain regional mobility and local connectivity.

2.3 Supporting Information

2.3.1 Existing Conditions

U.S. 1 is a principal arterial divided highway with four lanes of through traffic in each direction near I-540, three lanes of through traffic in each direction north of I-540 to the intersection of Durant Road/Perry Creek Rd, and two lanes of through traffic in each direction for the remainder of the project study area. The median along U.S. 1 is predominately a grass depression with paved shoulders along the interior edge of travel but transitions to raised concrete islands at intersections. The road currently carries a range of 40,000 vpd north of N.C. 98 Business (Durham Highway) to 65,000 vpd near I-540.

The current structure inventory is as follows:

- ❖ Bridge #911004 carrying I-540 flyover over U.S. 1
- ❖ Bridge #911000 carrying I-540 inner loop over U.S. 1
- ❖ Bridge #910999 carrying I-540 outer loop over U.S. 1
- ❖ Bridge #911003 carrying I-540 on-loop over U.S. 1
- ❖ Culvert #910304 carrying Perry Creek under U.S. 1
- ❖ Bridge #910305 carrying U.S. 1N over Neuse River
- ❖ Bridge #910306 carrying U.S. 1S over Neuse River
- ❖ Bridge #910312 carrying U.S. 1N over CSX Railroad
- ❖ Bridge #910560 carrying U.S. 1S over CSX Railroad
- ❖ Culvert #910672 carrying Richland Creek under U.S. 1
- ❖ Bridge #911083 carrying N.C. 98 Bypass over U.S. 1
- ❖ Bridge #910314 carrying U.S. 1N over N.C. 98 Business
- ❖ Bridge #910671 carrying U.S. 1S over N.C. 98 Business

Multimodal transportation is present throughout the project study area. GoTriangle and GoRaleigh operate bus routes along and crossing U.S. 1. The Wake Forest/Raleigh Express Bus (WRX) does not stop along U.S. 1 but travels between Raleigh and Wake Forest during the AM and PM peak hours. The Neuse River Greenway, part of the Capital Area Greenway System as well as North Carolina’s Mountains to Sea Trail, passes underneath U.S. 1 along the southern bank of the Neuse River. Several other existing and proposed greenways are present in the project study area. CSX Railroad maintains tracks that pass under U.S. 1 and is part of the Southeast Corridor (Raleigh to Richmond) Tier II Study⁶.

2.3.2 Secondary Benefits of the Project

2.3.2.1 Reduced Crash Potential

The information in this section is summarized from the *U-5307 Crash Data Analysis* (April 2021) which expands upon an earlier memorandum completed in 2016 for the U.S. 1 segments south of N.C. 98 Business.

Crash data were collected for the project corridor between I-540 eastbound ramps and N.C. 98 Business (Durham Road) northern ramps for the five-year period (June 1, 2011 through May 31, 2016). There were 1,870 collisions, seven of which were fatal, over the five-year period. **Table 2-1** shows a summary of crash types along the corridor. As shown in the table, 1,207 crashes (approximately 65 percent of all collisions) were rear-end collisions. These are typically associated with stop-and-go conditions along congested corridors.

Table 2-1. Roadway Segment Crash Type Summary (June 1, 2011 - May 31, 2016)

Roadway Segment	Type of Crash							
	Rear End	Side-swipe	Angle	Ran Off Road	Left Turn	Right Turn	Head-On	Other*
U.S. 1 from I-540 eastbound ramps to N.C. 98 Business (Durham Road) northern ramps	1,207	213	119	84	71	34	4	138

* Other types of crashes include collisions with fixed and movable objects, crashes caused by backing up, and collisions with animals.

Approximately 50 percent of rear-end collisions, the most prevalent crash type in the study area, were concentrated at signalized intersections. Signalized intersections are typically associated with

⁶ For more information, visit <https://railroads.dot.gov/environment/environmental-reviews/southeast-high-speed-rail-richmond-va-raleigh-nc>.

stop-and-go traffic; however, this condition becomes more dangerous when traveling at higher speeds. At 55 mph (the posted speed limit along U.S. 1), drivers must react quickly to stopped vehicles and collisions can prove to be more fatal than collisions at lower speeds. Approximately 40 percent of all rear-end collisions (472) occurred within ½ mile of the intersection of U.S. 1 and Durant Road/Perry Creek Road. In addition, approximately 11.5 percent of all rear-end collisions (139) took place within ½ mile of the intersection of U.S. 1 and New Falls of Neuse Road/U.S. 1A (South Main Street).

3 Alternatives

3.1 Preliminary Study Alternatives

3.1.1 No-Build Alternative

Under the No-Build Alternative, the existing intersections would remain signalized, and access would not be restricted to U.S. 1. This alternative would result in no new construction costs; no impacts to streams, wetlands, or other natural or cultural resources; and no residential or business relocations. However, this alternative would not address the congestion and travel time issues along the corridor. **The No-Build Alternative would not meet the needs of the proposed project to reduce congestion and improve travel times along the corridor.** The No-Build Alternative provides a basis for comparing the adverse impacts and benefits of the study alternatives.

3.1.2 Alternative Modes of Travel

Transit service already is in place along the corridor. Additional bus service would not reduce congestion substantially to meet the needs of the corridor. The construction of a light-rail facility would have extensive impacts and costs. These costs and impacts would be incurred without meeting the need to reduce congestion and improve travel times along the corridor⁷.

3.2 Build Alternatives

The information presented in [Section 3.2](#) is summarized from a combination of previous presentations, informational packets, and memos, mainly relating to previous Concurrence Points and their respective documentation. For additional information on Concurrence Points, view [Section 6.3](#) (NEPA/404 Merger Process).

⁷ The current project design includes 12' full-depth pavement shoulders (outside) that are able to accommodate bus on shoulder use if the City of Raleigh, Town of Wake Forest, and CAMPO elect to pursue that option.

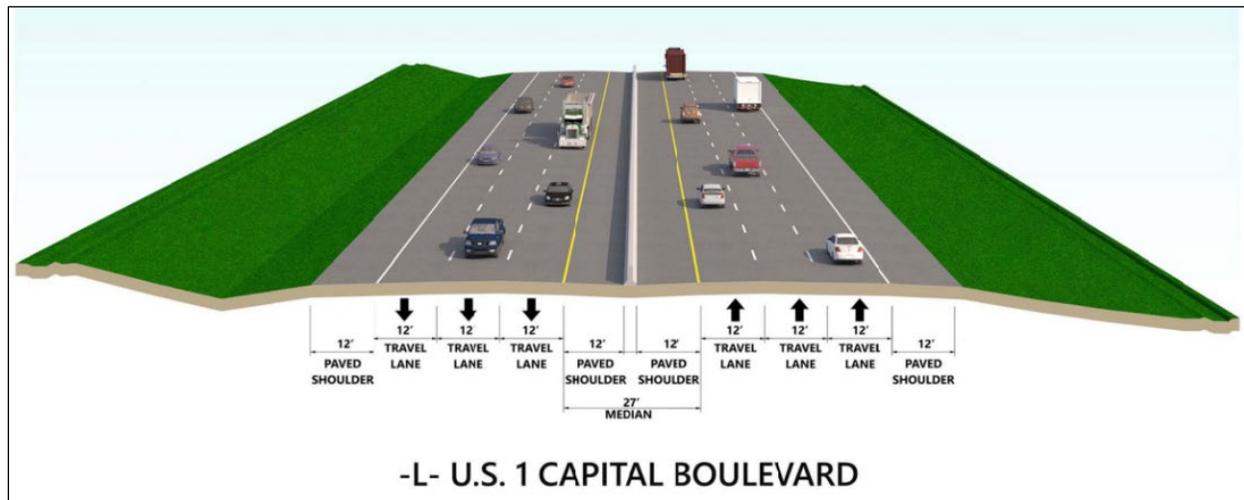
3.2.1 Design Criteria

The build alternatives were developed using American Association of State Highway and Transportation Officials (AASHTO) and NCDOT guidelines for a freeway using a 70-mph design speed. Six 12' lanes, three in each direction, will be provided along U.S. 1 with auxiliary lanes and transition lanes between interchanges where warranted. Local service/connector roads will have two 11' to 12' lanes, one in each direction, with left-turn lanes as needed. A 10' MUP/side path to accommodate bicycles and pedestrians will be included in addition to a sidewalk along the local service/connector roads (as appropriate). Traffic operations supporting a six-lane mainline section along U.S. 1 with auxiliary lanes as needed is included in **Table 3-1**. The mainline typical section is presented in **Exhibit 3-1**.

Table 3-1. U.S. 1 Future (2040) Travel Time Comparison

Location	Travel Time (min:sec)			
	AM Peak		PM Peak	
	Six-Lane	Eight-Lane	Six-Lane	Eight-Lane
U.S. 1 Southbound	10:24	10:12	10:12	10:06
U.S. 1 Northbound	10:16	10:07	10:31	10:16

Exhibit 3-1. U.S. 1 Typical Section⁸



⁸ Typical section shown is the proposed three-lane typical section recommended for the length of the project. Auxiliary and/or transition lanes may be necessary for traffic operations or geometric constraints. For additional details, see [Section 3.2.7](#).

3.2.2 Design Alternatives (by Interchange/Intersection Location)

Removal of at-grade intersections along U.S. 1 and the conversion of major intersections to interchanges has been a driving factor for this project, steering much of the alternative analysis. Based on traffic, the intersections listed in **Exhibits 3-2 through 3-6** were determined to be converted from signalized, at-grade intersections to fully functioning interchanges. The remaining intersections along U.S. 1 will be closed, and entrances moved to service/connector roads. The following initial interchange concept designs were developed for the project.

Exhibit 3-2. I-540 at U.S. 1 Interchange Design Concepts

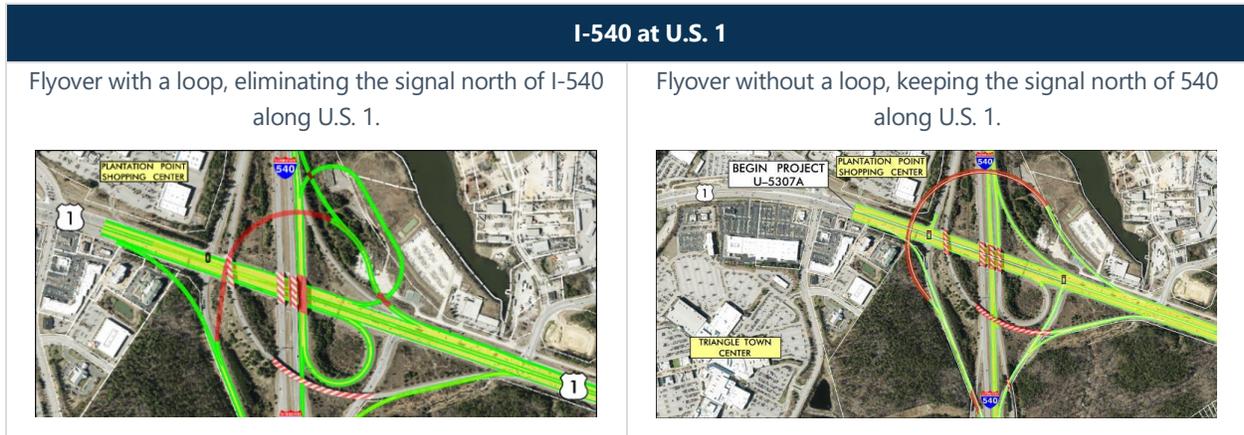


Exhibit 3-3. Durant Road/Perry Creek Road at U.S. 1 Interchange Design Concepts

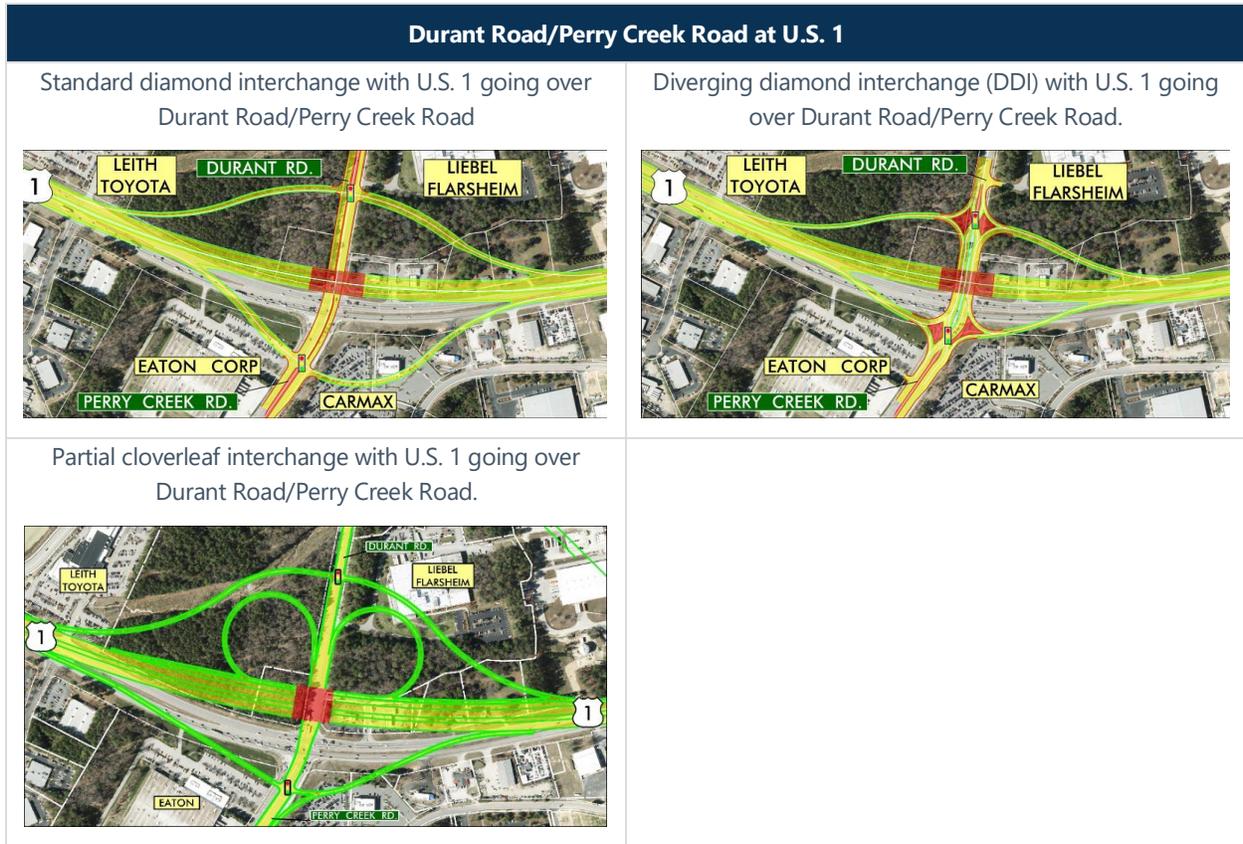


Exhibit 3-4. Burlington Mills Road at U.S. 1 Interchange Design Concepts

Burlington Mills Road at U.S. 1	
<p>A standard diamond interchange with U.S. 1 going over Burlington Mills Road.</p> 	<p>A standard diamond interchange with Burlington Mills Road going over U.S. 1.</p> 
<p>A DDI with U.S. 1 going over Burlington Mills Road.</p> 	<p>A diamond interchange with a flyover from Burlington Mills to U.S. 1 southbound with U.S. 1 going over Burlington Mills Road.</p> 
<p>A partial cloverleaf interchange with U.S. 1 going over Burlington Mills Road.</p> 	<p>A trumpet interchange with U.S. 1 going over Burlington Mills Road.</p> 

Exhibit 3-5. Falls of Neuse Road/U.S. 1A (South Main Street) Interchange Design Concepts

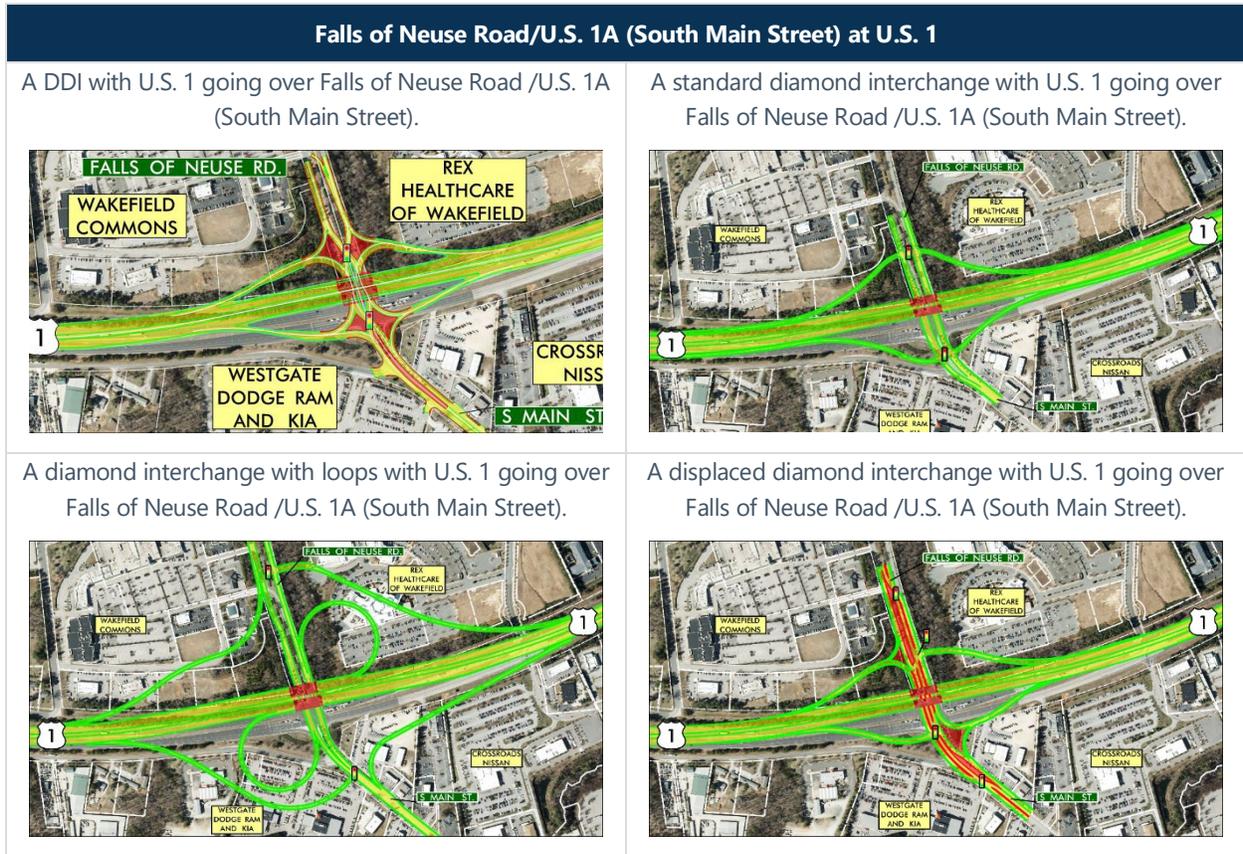


Exhibit 3-6. Purnell Road/Harris Road at U.S. 1 Interchange Design Concepts

Purnell Road/Harris Road at U.S. 1	
<p>Partial Cloverleaf with U.S. 1 going over Purnell Road/Harris Road.</p> 	<p>Partial Cloverleaf Option 1 with U.S. 1 going under Purnell Road/Harris Road.</p> 
<p>A diamond interchange with a loop at Purnell Road/Harris Road/U.S. 1 with U.S. 1 going over Purnell Road/Harris Road.</p> 	

3.2.3 Alternatives Comparison

A comparison of traffic operations and impacts for the interchange concepts shown in **Exhibits 3-2 through 3-6** is given in **Table 3-2**. Critical Lane analysis was used to determine a design’s Level of Service for comparison purposes. Peak hour turning movement volumes were calculated, then each movement volume was divided by the number of lanes for that movement. The resulting volume is the hourly volume per lane. The critical volume is the highest movement volume in a signal phase, divided by the number of lanes. The critical volume of the intersection is the sum of the critical lane volumes for all signal phases. A volume over capacity ratio greater than one means the road is over capacity.

Table 3-2. Comparison of Build (2040) Options

Intersection	Interchange Type	Critical Lane Volume*	Volume/Capacity*	Lanes Required Under/On Bridge	Lanes Required on Cross Street
I-540	Flyover with Loop	N/A	N/A	N/A	N/A
	Flyover without Loop	N/A	N/A	N/A	N/A
Durant Road/ Perry Creek Road	Diamond	1,536	1.02	8	4
		1,424	.89	10	6
	DDI	1,522	1.01	4	4
		1,246	.78	6	6
	Partial Cloverleaf	1,402	.88	6	4
		1,250	.78	8	6
Burlington Mills Road	Diamond (under)	1,567	.98	6	2
		1,192	.74	7	2
	Diamond (over)	1,192	.74	7	2
	DDI	2,014	1.26	4	2
		1,366	.85	5	3
	Flyover	1,156	.72	2	2
	Partial Cloverleaf	1,336	.83	6	4 to east 2 to west
Trumpet	All movements free-flowing				
	DDI	1,157	.72	4	4

Intersection	Interchange Type	Critical Lane Volume*	Volume/Capacity*	Lanes Required Under/On Bridge	Lanes Required on Cross Street
Falls of Neuse Road/U.S. 1A	Diamond	1,177	.74	8	4
	Diamond with Loops	1,326	.83	6	4
	Displaced Diamond	1,097	.69	8	4
Purnell Road/Harris Road	Partial Cloverleaf	1,378	.86	4	4 to east 2 to west
	Diamond with Loop	1,135	.71	4	4 to east 2 to west
	Partial Cloverleaf with a Loop	1,378	.86	4	4 to east 2 to west

* Values shown are PM peak hour for 2040.

Legend – Comparison of Build Options

	Vehicles per Hour	V/C Ratio
	<1,200	.75
	1,200-1,399	.87
	1,400-1,599	1.00
	>1,600	>1.00

3.2.4 Alternatives Considered but Eliminated

As a result of the alternative concept screening, a decision was made by the Merger Team at Concurrence Point 2 (November 2018) and the Revised Concurrence Point 2 (April 2021) to eliminate certain alternatives, shown in **Table 3-3** (see [Section 6.3.2](#) for additional details).

Table 3-3. Interchange Concepts Considered but Eliminated

Location	Interchange Concept	Reason Eliminated
I-540 at U.S. 1	Flyover with a Loop	Constructability issues and weaving problems.
Durant Road/Perry Creek Road at U.S. 1	Partial Cloverleaf	Greater impacts to properties, high construction cost, potential weaving problem.
	Diamond Interchange	Greater impacts to properties, high construction cost.
Burlington Mills Road at U.S. 1	Flyover	Greater impacts to properties; restrict access to other properties.
	Partial Cloverleaf	Greater impacts to properties in two quadrants.
	Trumpet	Greater impacts to properties in all quadrants.
	Diamond (U.S. 1 over Burlington Mills Rd)	Impacts to two cemeteries.
Falls of Neuse Road/ U.S. 1A (South Main Street) at U.S. 1	Diamond	Unable to handle traffic operations adequately.
	Diamond with Loops	Greater impacts to properties; unable to handle traffic operations adequately.
	Displaced Left-Turn Interchange	Would restrict access to properties along South Main Street; higher construction cost.
Purnell Road/ Harris Road at U.S. 1	Diamond with Loop	Impacts to a historic property; greater impacts to adjacent properties.

3.2.5 Alternatives Carried Forward

Based on the review of alternatives at Concurrence Point 2 (November 2018) and the Revised Concurrence Point 2 (April 2021) (see [Section 6.3.2](#) for additional details), the Merger Team made a decision to carry the following alternatives forward:

U.S. 1 Mainline

U.S. 1 will be converted to a fully controlled-access highway, best fit alignment for the centerline with consideration of maintenance of traffic during construction. U.S. 1 will be widened to accommodate six through lanes. Additional auxiliary and transition lanes will be included between interchanges as warranted.

Service/Connector Roads

Because U.S. 1 will be a full controlled-access highway, all at-grade intersections and driveways along U.S. 1 will be eliminated. Service/connector roads are included as part of this project. [Section 4.8](#) details the service/connector roads involved.

New and Existing Interchanges

The interchange concepts presented in **Table 3-4** and **Exhibits 3-7 through 3-13** were developed into interchange design alternatives.

Table 3-4. Interchange Alternatives Carried Forward for Additional Analysis

Location	Interchange Alternative
I-540 at U.S. 1	❖ Flyover with no Loop
Durant Road/Perry Creek Road at U.S. 1	❖ Minimized DDI
Burlington Mills Road at U.S. 1	❖ Diamond (Option A) ❖ Skewed Partial Cloverleaf (Option B)
Falls of Neuse Road/U.S. 1A (South Main Street) at U.S. 1	❖ Diverging Diamond Interchange (DDI)
N.C. 98 Bypass at U.S. 1	❖ Ramp Improvements
N.C. 98 Business at U.S. 1	❖ Ramp/loop additions to existing interchange
Purnell Road/Harris Road at U.S. 1	❖ Partial Cloverleaf (Option 1) ❖ Partial Cloverleaf (Option 2)

Exhibit 3-8. Preliminary Durant Road/Perry Creek Road at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023)

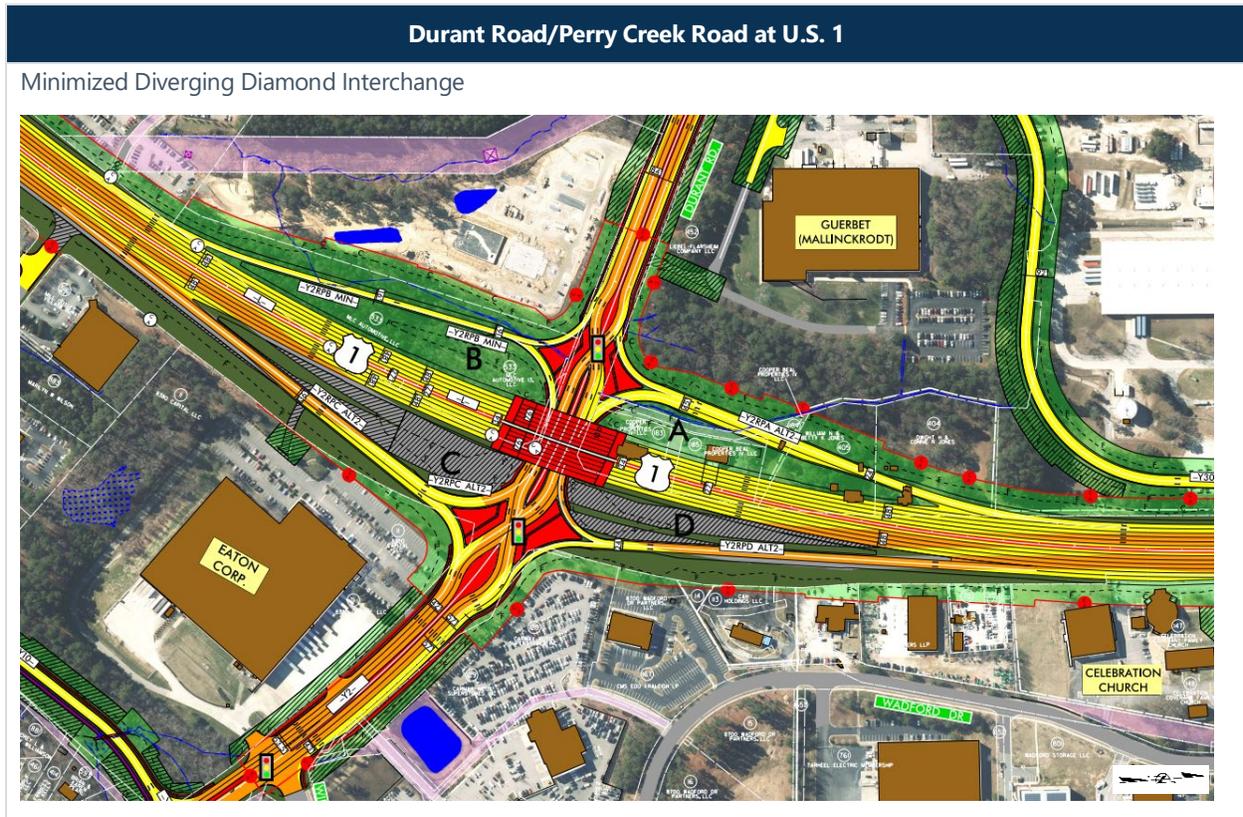


Exhibit 3-9. Preliminary Burlington Mills Road at U.S. 1 Interchange Designs to be Presented at the Public Hearing (June 2023)

Burlington Mills Road at U.S. 1

Option A, Diamond Interchange



Option B, Skewed Partial Cloverleaf



Exhibit 3-10. Preliminary Falls of Neuse Road/U.S. 1A (South Main Street) at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023)

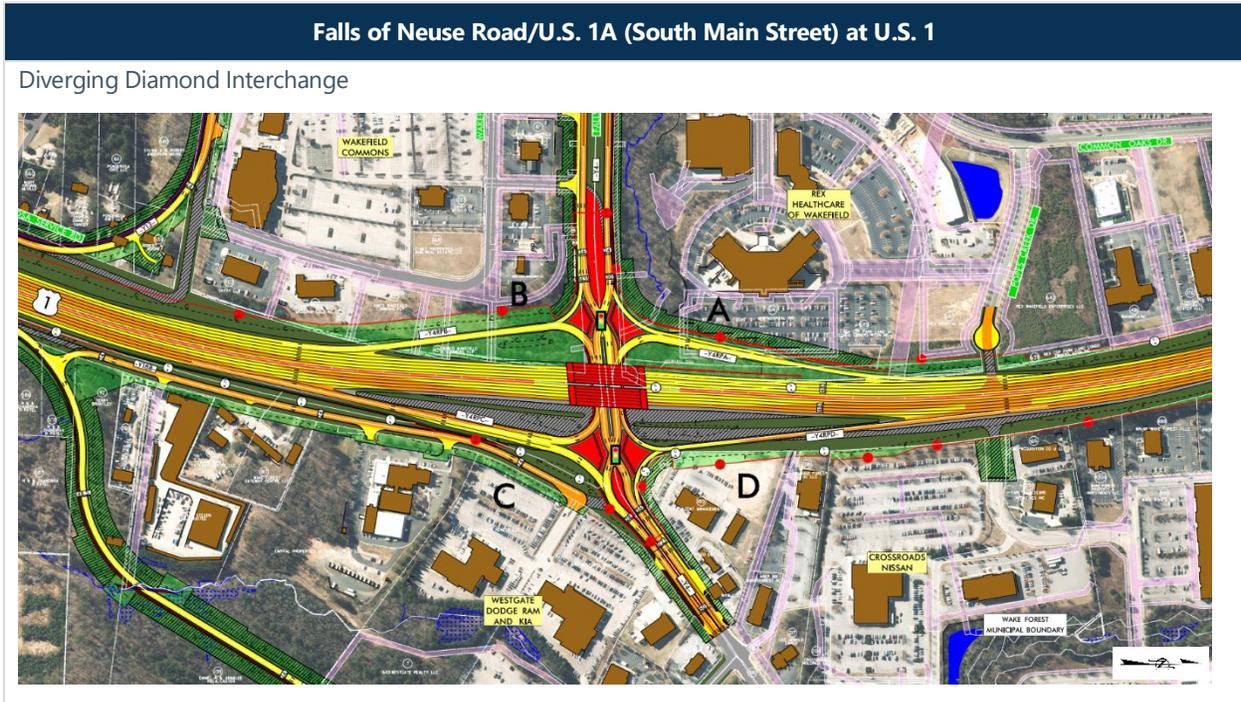


Exhibit 3-11. Preliminary N.C. 98 Bypass at U.S. 1 Interchange Design to be Presented at the Public Hearing (June 2023)

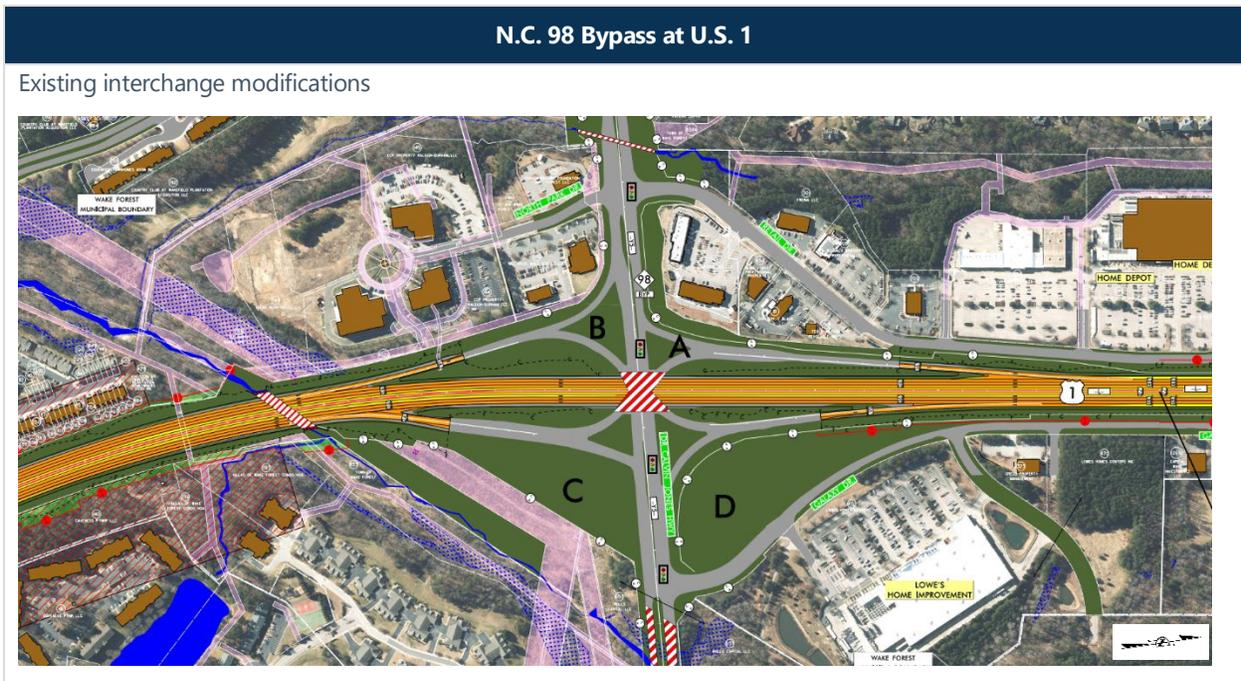


Exhibit 3-13. Preliminary Purnell Road/Harris Road at U.S. 1 Interchange Designs to be Presented at the Public Hearing (June 2023)

Purnell Road/Harris Road at U.S. 1

Option 1, Partial Cloverleaf



Option 2, Partial Cloverleaf



Gresham Lake Road Extension

Multiple alternatives for the intersection of Gresham Lake Road at U.S. 1 have been considered and are presented in **Exhibit 3-14**. The typical section for the proposed alternatives for Gresham Lake Road Extension was modified following municipal coordination in late 2022 and early 2023 and will be shown at the Public Hearing in 2023. Previous options included a four-lane typical section and the options shown at the Public Hearing will include a reduced, two-lane typical section.

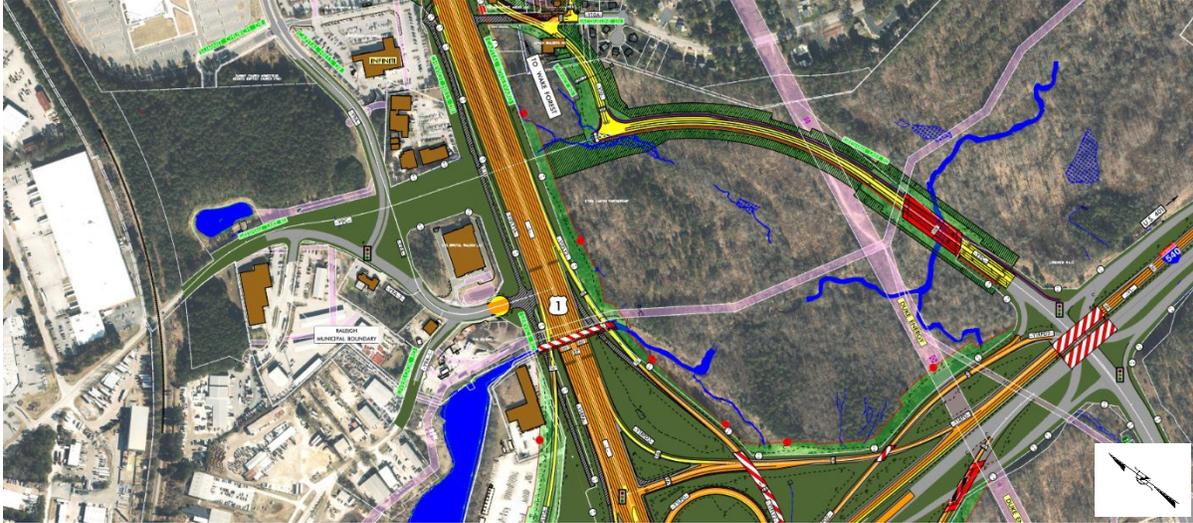
Exhibit 3-14. Gresham Lake Road Extension Alternatives to be Presented at the Public Hearing (June 2023)



Exhibit 3-14 continued...

Gresham Lake Road Extension

Option 3, Gresham Lake Road Cul-de-sac west of U.S. 1 plus Triangle Town Boulevard Extension from I-540 to the new location service/connector roadway at Jacqueline Lane east of U.S. 1.

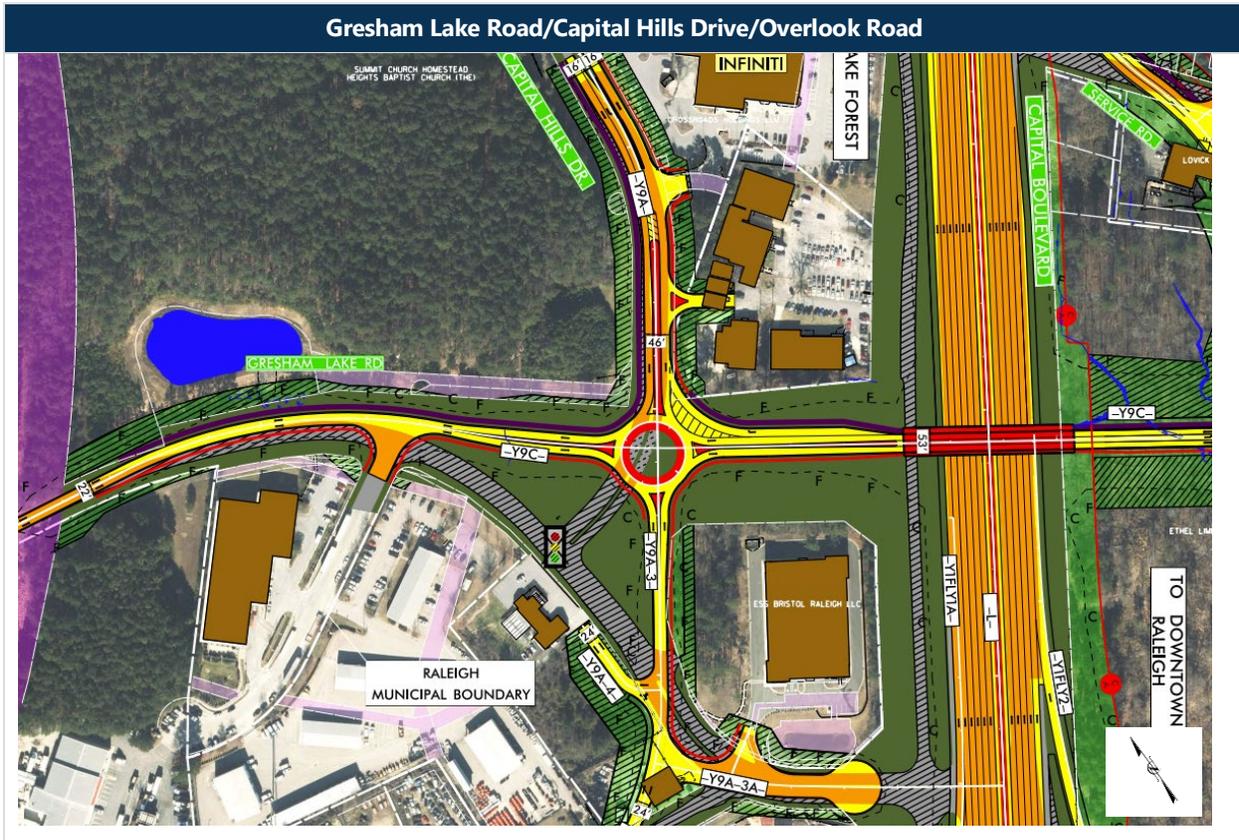


Option 4, Gresham Lake Road Extension Overpass plus Triangle Town Boulevard Extension from I-540 with both connecting to the new location service/connector roadway at Jacqueline Lane east of U.S. 1.



A roundabout on the west side of U.S. 1 at the intersection Gresham Lake Road/Capital Hills Drive/Overlook Road was requested by the City of Raleigh in lieu of a signalized intersection. This option is currently under consideration and will be presented at the 2023 Public Hearing. Preliminary concept plans are available in **Exhibit 3-15**.

Exhibit 3-15. Gresham Lake Road/Capital Hills Drive/Overlook Road Roundabout Option to be Presented at the Public Hearing (June 2023)



Stadium Drive/Jenkins Road Grade Separation

The current at-grade intersection connection between Stadium Drive and Jenkins Road will be replaced with a grade separation (Stadium Drive/Jenkins Road Overpass) and can be seen in **Exhibit 3-16**. A Hot SPOT study was completed on possibly adding an interchange in the future as a separate project. An interchange is not currently proposed here, but this does not preclude the addition of interchange ramps in the future, as mentioned in the Hot SPOT study.⁹

Exhibit 3-16. Jenkins Road/Stadium Drive Overpass to be Presented at the Public Hearing (June 2023)



Neuse River Bridge Options

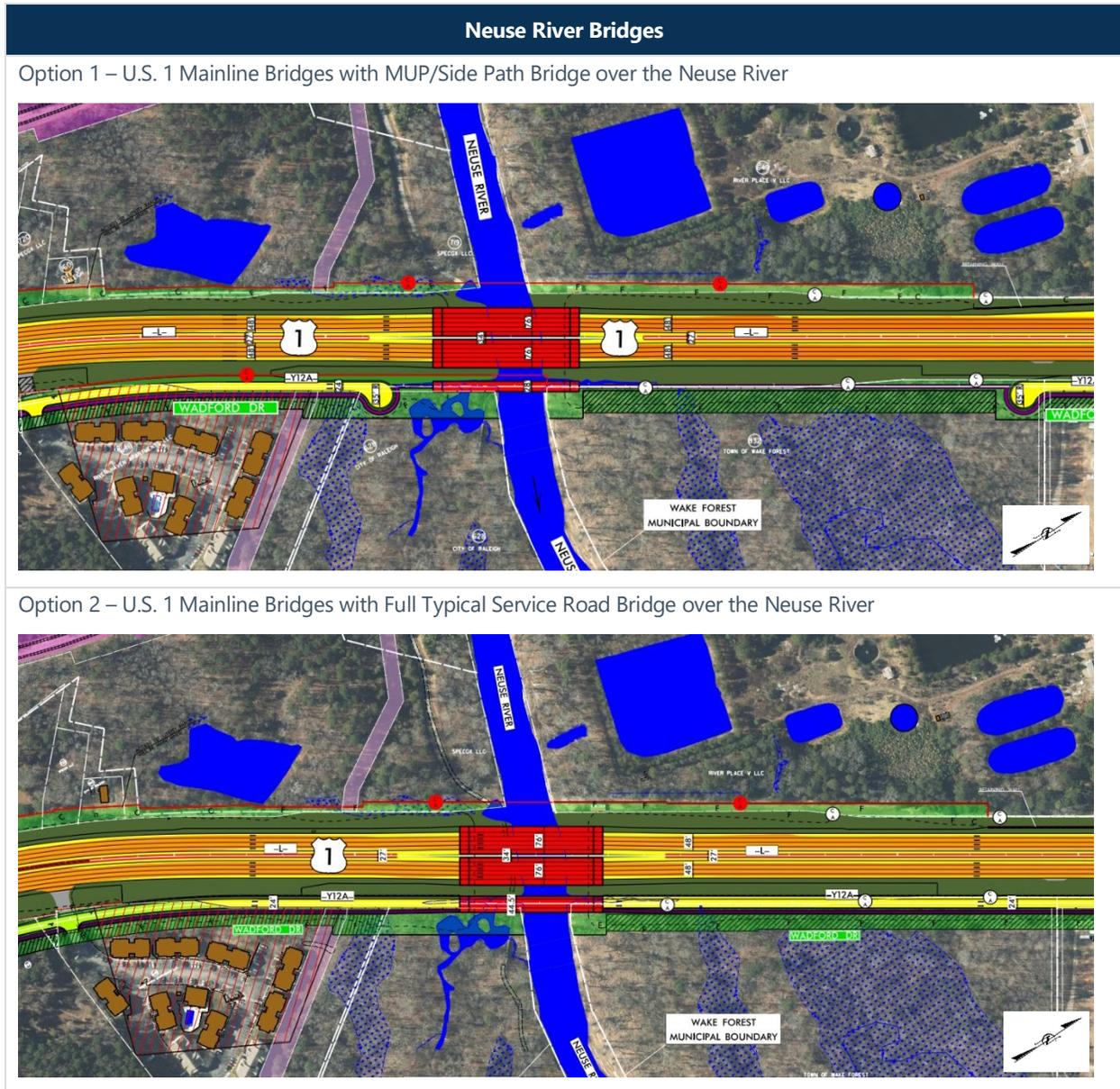
The current U.S. 1 mainline bridges over the Neuse River are proposed to be replaced by dual 345' bridges and are available in **Exhibit 3-17**. The proposed bridge length was determined as part of Concurrence Point 2A and includes an additional 65' of length to accommodate wildlife crossing underneath.

In addition to the U.S. 1 mainline bridges only (original Option 1), two options for the service/connector road bridge along U.S. 1 that cross the Neuse River have been considered. The

⁹ *The CAMPO Northeast Area Study (2014)* "was initiated by CAMPO to identify a sustainable transportation strategy for the growing communities of Wake Forest, Knightdale, Raleigh, Wendell, Zebulon, Rolesville, Bunn, Franklinton, and Youngsville". A [2021 update](#) to the study includes a proposed interchange concept at U.S. 1 and Jenkins Road/Stadium Drive.

first alternative (Option 2) was shown at Public Meeting 2 in December 2021 as the betterment option and includes a full vehicular bridge plus MUP/side path. Following municipal coordination efforts after Public Meeting 2, Option 1 was updated to also include a bridge that would be used for construction phasing temporarily and then converted to a pedestrian MUP/side path connection over the Neuse River once construction was complete. This revised option would connect the Wadford Drive and Meadstone Way cul-de-sacs via a multi-use path only.

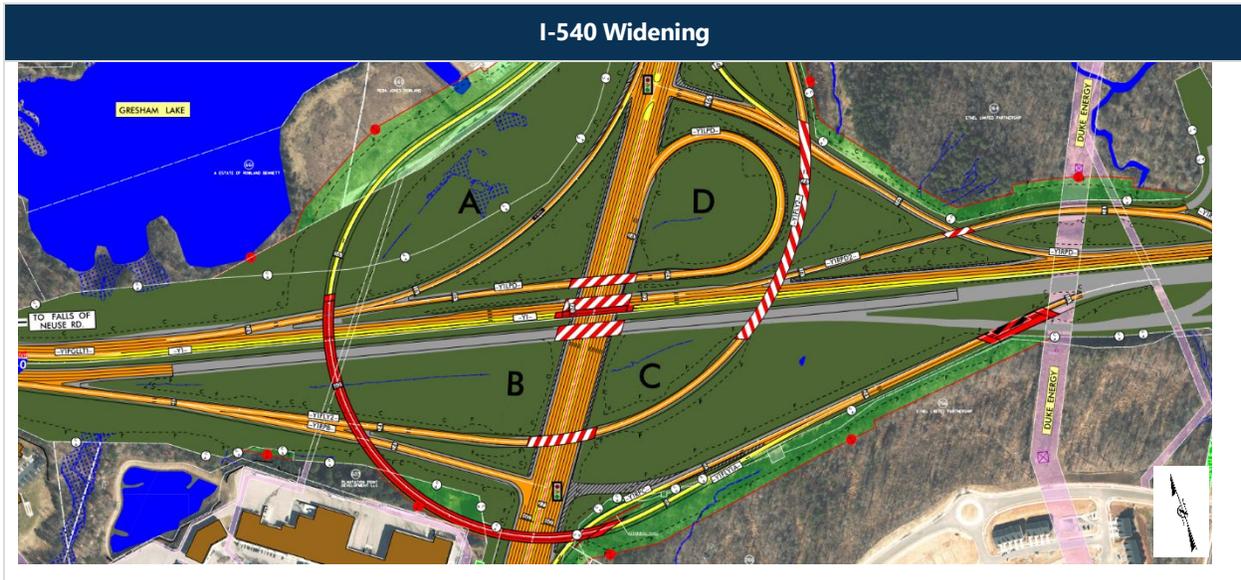
Exhibit 3-17. Neuse River Bridging Options to be Presented at the Public Hearing (June 2023)



I-540 Additional Westbound Through Lane

There is only one option for improvements to I-540 westbound as shown in **Exhibit 3-18**. The addition of a third westbound through lane on I-540 at the U.S. 1 interchange will bring lane continuity to the interchange and improved traffic operations.

Exhibit 3-18. I-540 Widening Option to be Presented at the Public Hearing (June 2023)



3.2.6 NCDOT Recommended Alternatives

All bridge/grade separation/interchange alternatives shown in [Section 3.2.5](#) of this Environmental Assessment are still under consideration and will be presented to the public at an upcoming Public Hearing (June 2023); however, NCDOT currently recommends the following alternatives in **Table 3-5** which can be seen in **Appendix F** (Public Meeting Documents).

Table 3-5. Current NCDOT Recommended Alternatives

Location	NCDOT Recommended Bridge/Grade Separation/Interchange Alternative
I-540 at U.S. 1	❖ Flyover with no Loop
Gresham Lake Road	❖ Overpass with connection to the new location service/connector road (Option 2)
Durant Road/Perry Creek Road at U.S. 1	❖ Minimized DDI
Neuse River Bridge	❖ Bicycle and Pedestrian Bridge (Option 1)
Burlington Mills Road at U.S. 1	❖ Diamond Interchange (Option A)
Falls of Neuse Road/ U.S. 1A (South Main Street) at U.S. 1	❖ Diverging Diamond Interchange
N.C. 98 Bypass at U.S. 1	❖ Ramp Improvements
N.C. 98 Business at U.S. 1	❖ Ramp/loop additions to existing interchange and replace U.S. 1 bridges over N.C. 98 Business
Stadium Drive/ Jenkins Road	❖ Grade Separation
Purnell Road/ Harris Road at U.S. 1	❖ Partial Cloverleaf (Option 2)

3.2.7 Traffic Operations Analysis and Number of Lanes

A memorandum summarizing the traffic forecast and capacity operation analysis to date, *U-5307 Typical Section/Number of Lanes Memo*, was completed in February 2023. The lane schematic from that memo summarizing the U.S. 1 mainline typical section is included as **Appendix B, Figure 1 through Figure 4**. In late 2018, after determining the proposed interchange concepts to move forward with to the design stage (see [Section 3.2.5](#)), the number of lanes required on U.S. 1 was revisited.

The Basic Freeway module of HCS 7 was used to determine the maximum peak hour volume for one direction of a four, six, or eight-lane facility in order to obtain a Level-of-Service (LOS) D, E, and F. Using the directional split factor (0.55) and design hourly volume factor (0.08) from the traffic forecast, the peak hour volume was adjusted to an equivalent daily volume amount.

The volumes (vpd) shown in **Table 3-6** indicate the estimated threshold for LOS D under the conditions of the U-5307 project for a four, six, and eight-lane facility.

Table 3-6. LOS D Thresholds for U-5307 Basic Freeway Segments

	Basic Freeway Segment		
	4-Lanes	6-Lanes	8-Lanes
LOS D Threshold	76,704 vpd	115,068 vpd	153,431 vpd

Note – A specific LOS goal is not established in the purpose and need statement. Evaluating the LOS D threshold provided a measure of comparison and was not a means for eliminating alternatives from further consideration.

Due to the extended project timeline, an estimation of project life was also developed as part of the above referenced typical section memo to provide supplemental information to the 2040 LOS calculations.

To estimate project life, an annual growth rate of three percent was used after evaluating historic traffic growth. Without a traffic forecast beyond 2040, a three percent annual increase in the forecasted 2040 Build volumes was determined to be a conservative, reasonable value for U.S. 1. By growing 2040 Build Average Annual Daily Traffic (AADT) volumes by three percent annually, project life was determined to be the year LOS decreased from D to E and E to F.

Table 3-7 illustrates the estimated project life for the proposed corridor improvements as a six-lane facility is 2042-2045 from Durant Road/Perry Creek Road to N.C. 98 Bypass if LOS D or better is desired, and 2045-2050 for LOS E or better. It should be noted that the need for auxiliary or transitional lanes between interchanges will increase the minimum number of lanes required between those interchanges. See **Appendix B** for the associated U.S. 1 mainline lane schematics.

Table 3-7. Project Life Expectancy Based on 2040 Build Volumes, LOS Threshold of Basic Freeway Segments, and Geometric Design Requirements

Segment	Estimated 2040 Vol.	Existing Thru-Lanes	Minimum # of Lanes for LOS D or Better	# Lanes in Current Design				Project Life Expectancy by LOS & Year			
				Thru-Lanes	Transition Lanes	Auxiliary Lanes	Total # Lanes	6 Thru-Lanes		8 Thru-Lanes	
								LOS E >115,068 vpd	LOS F >129,705 vpd	LOS E >153,431 vpd	LOS F >172,909 vpd
I-540 to Durant Rd / Perry Creek Rd	95,000	6 – 8	6	6	2	2	10	2047	2052	2060	2067
Durant Rd / Perry Creek Rd to Burlington Mills Rd	108,200	4 – 5	6	6	2	0	8	2042	2046	2054	2060
Burlington Mills Rd to U.S. 1A (Main St) / Falls of Neuse Rd	105,400	4	6	6	2	0	8	2043	2047	2055	2061
U.S. 1A (Main St) / Falls of Neuse Rd to N.C. 98 Bypass	98,900	6	6	6	2	0	8	2045	2050	2058	2065
N.C. 98 Bypass to N.C. 98 Business	90,000	4	6	6	0	2	8	2049	2054	2063	2071
N.C. 98 Business to Harris Rd / Purnell Rd	84,600	4	6	6	0	0	6	2052	2057	2067	2075
Harris Rd / Purnell Rd to Project end	57,200	4	4	4	0	0	4	2073	2082	2096	2107

Estimated 2040 volumes were determined as part of the project's approved traffic forecast. Volumes beyond the 2040 horizon year are extrapolated from the approved 2040 traffic forecast and are not based on new design year data. LOS D and E threshold years are estimated based on these volumes grown at 3 percent annually and are meant to provide a preliminary understanding of when U.S. 1 is likely to reach gridlock conditions. These values are estimates only and subject to change.

4 Proposed Improvements

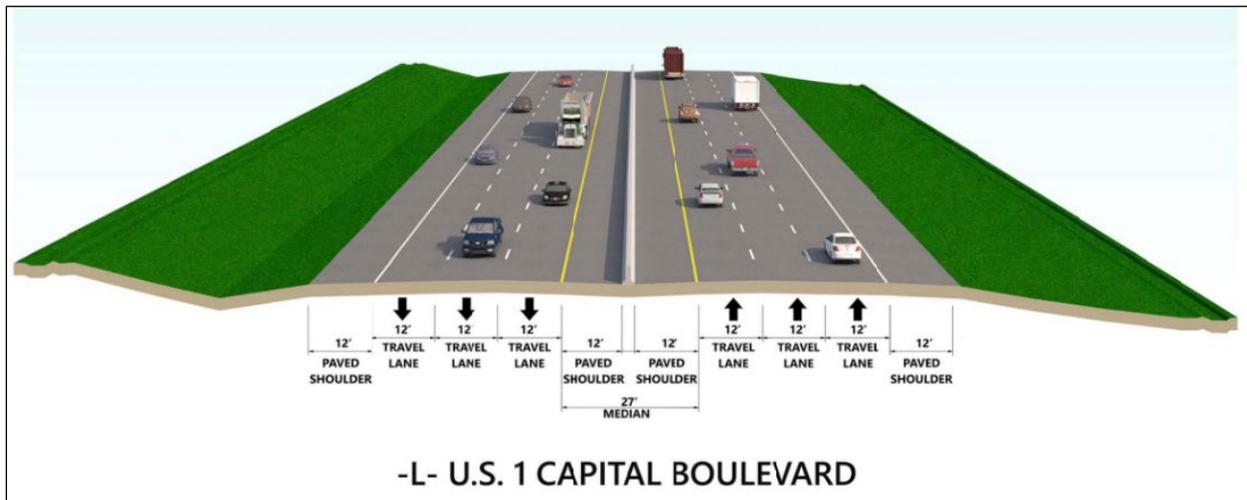
4.1 Roadway Typical Sections

4.1.1 U.S. 1

U.S. 1 will be widened to accommodate three 12' travel lanes in each direction as seen in **Exhibit 4-1**. Auxiliary lanes and transition lanes will also be included between interchanges. All lanes along U.S. 1 will be 12' wide. A 27' concrete median will extend the entire length of the project.

In addition, 12' full-depth pavement outside shoulders will be included along U.S. 1 to accommodate transit and/or EMS vehicles. This shoulder width is consistent with the CAMPO/GoTriangle *Triangle Region Bus on Shoulder Study* (October 2020). Current designs do not preclude bus-on-shoulder (outside) in the future¹⁰.

Exhibit 4-1. U.S. 1 Proposed Mainline Typical Section



¹⁰ Additional coordination during final design with CAMPO, City of Raleigh, Town of Wake Forest, and GoTriangle will be necessary to determine final bridge lengths over U.S. 1.

4.1.2 Service/Connector Roads

Typical sections of all service/connector roads have been evaluated between the NCDOT, the City of Raleigh, Town of Wake Forest, and CAMPO. The typical sections will, at a minimum, be one lane in each direction, as well as include sidewalks and/or a MUP/side path. An example typical section from the Y10 Service Road near Jacqueline Lane is included as **Exhibit 4-2**. All typical sections can be seen on the 2023 Public Hearing Maps included in **Appendix F**.

Exhibit 4-2. Example Proposed Service/Connector Road Typical Section



4.2 Right-of-Way

Right of way along U.S. 1 will range from 230' to 290'. A majority of the additional required right of way will be to accommodate service/connector roads.

4.3 Access Control

U.S. 1 mainline and interchanges will be fully controlled-access. Driveway access will be provided along the service/connector roads.

4.4 Design Speed and Speed Limit

The design speed along U.S. 1 will be 70 mph. Service/connector roads have a design speed range of 25 to 40 mph. Major y-line design speeds range from 50 to 60 mph.

4.5 Anticipated Design Exceptions

The information in this section is summarized from the *U-5307 Design Exception Checklist* (approved June 2022). The following design exceptions are anticipated in **Table 4-1**.

Table 4-1. Anticipated Design Exceptions

Location	Design Exception
Durant Road/Perry Creek Road	❖ Vertical Stopping Sight Distance (Crest Vertical Curves)
Purnell Road/ Harris Road	❖ Minimum Horizontal Curve Radius
	❖ Vertical Stopping Sight Distance (Crest Vertical Curves)
Capital Hills Drive	❖ Vertical Stopping Sight Distance (Crest Vertical Curves)
Wakefield Plantation Drive	❖ Vertical Stopping Sight Distance (Crest Vertical Curves)
Retail Drive	❖ Minimum Horizontal Curve Radius
Connector/Service Road between Stadium Drive and Wake Forest Crossing Shopping Mall	❖ Minimum Horizontal Curve Radius
	❖ Vertical Stopping Sight Distance (Crest Vertical Curves)

4.6 Structures/Bridging Decisions

4.6.1 Drainage Structures

As agreed to during the Concurrence Point 2A Merger Meeting, **Table 4-2** includes the recommended drainage structures.

Table 4-2. Recommended Drainage Structures from Concurrence Point 2A

Site	Route	Stream Name	Drainage Area (sq mile)	Existing Structure	Preliminary Recommended Structure
1	I-540	Unnamed Tributary	0.23	72" RCP	Retain existing 72" RCP
2	I-540	Unnamed Tributary	1.27	2 @ 8' x 6' RCBC	Retain existing 2 @ 8' x 6' RCBC and add a supplemental 72" pipe
3	SR 2013 (Gresham Lake Road)	Perry Creek	5.33	N/A	300' bridge
4	U.S. 1	Perry Creek	3.74	3 @ 8' x 8' RCBC	Retain and extend existing RCBC and add a supplemental 84" pipe
5	U.S. 1	Unnamed Tributary near Neuse	3.14	2 @ 8' x 8' RCBC	Retain and extend existing RCBC and add a supplemental 84" pipe
6	N/A	Unnamed Tributary near Neuse	3.49	N/A	48'W x 60'L bridge
7	N/A	Unnamed Tributary	0.1	N/A	1 @ 6' x 7' RCBC with notched sill
8	U.S. 1	Neuse River	792	Dual bridges over Neuse River on U.S. 1	345' dual bridges along U.S. 1 mainline and service road bridge
9	N/A	Unnamed Tributary	0.21	N/A	1 @ 7' x 8' RCBC
10	U.S. 1	Richland Creek	10.4	4 – 10' x 11' RCBC	Retain and extend existing RCBC and two 72" supplement pipes.
11**	N/A	Unnamed Tributary near Neuse	3.15	N/A	3 @ 9' x 8' RCBC
CSX	U.S. 1	N/A	N/A	Dual bridges over CSX on U.S. 1	300' bridges and service road bridge

* Note that the current recommendations are based on planning preliminary designs and will require further evaluation with more precise survey data during the final design phase.

** Site 11 was eliminated per NCDOT decision on 7/16/2021.

4.6.2 Non-Drainage Structures

New crossings of U.S. 1 will be constructed as a part of the roadway design at Gresham Lake Road, Durant Road/Perry Creek Road, Burlington Mills Road, Falls of Neuse Road/U.S. 1A (South Main Street), Jenkins Road/Stadium Drive and Purnell Road/Harris Road.

NCDOT made the decision to replace and lengthen the bridges on U.S. 1 over N.C. 98 Business instead of widening, as shown in the concurred upon preliminary plans, due to age and condition of the existing structures. There are no resources in this location to be impacted. Traffic will be maintained on-site during construction.

4.7 Interchanges/Grade Separations

Refer to [Section 3.2.5](#) for all interchanges and grade separations.

4.8 Service/Connector Roads

Major service/connector roads are provided for properties that will lose direct roadway or driveway access to U.S. 1. Existing and proposed service/connector roads are detailed in **Table 4-3**.

Table 4-3. Service/Connector Roads (Existing and Proposed)

Service Road Name	Improvements	Typical Section
Gresham Lake Road (Y9C)	Extension of roadway, including bridge over U.S. 1; will stop at service/connector road on east side of U.S. 1 (Option 2)	2-lane with sidewalk and MUP/side path
Capital Hills Drive (Y9A/Y9B)	Intersection improvements at Gresham Lake Road (south end)	2-lane with sidewalk and MUP/side path
Guerbet/Mallinckrodt Access Road (Y30)	Extension of Capital Hills Drive to provide main access for Guerbet and Mallinckrodt	2-lane with sidewalk and MUP/side path
Jacqueline Lane Service Road (Y-10)	New service/connector road to connect Gresham Lake Road to Perry Creek Road	2-lane with sidewalk and MUP/side path
Wadford Drive/ Meadstone Way Extension (Y-12)	Extension of roadways; multi-use bridge to connect the two roadways	2-lane with sidewalk and MUP/side path
Ponderosa Service Road Extension (Y13)	Extension of roadway both north and south of the proposed interchange	2-lane roadway with MUP/side path
Stroller Ridge Drive Extension (Y-16)	Extension of roadway to connect to Burlington Mills Road	2-lane roadway with sidewalk
Star Road (Y18A, Y18B)	Extension of roadway to connect to South. Main Street	2-lane roadway with sidewalk
Future Ligon Mill Road Extension (Y24B)	New service/connector road to connect to Wake Forest Crossing Shopping Center	4-lane roadway with MUP/side path
Service Road (Y26A, Y26B)	New service/connector road to Templerridge Road and St. Catherine Drive	3-lane roadway with MUP/side path
Wake Union Church Road Extension (Y25A/Y25B)	Extension of roadway south and north of Jenkins Road	3-lane roadway with MUP/side path
Country Club Drive (Y25B-1)	Realignment of roadway of roadway to connect to Wake Union Church Road	2-lane roadway with sidewalk
Wallridge Road (Y28) Harris Teeter Driveway (DR2)	New service/connector road to connect to Harris Teeter Shopping Center	2-lane roadway with sidewalk

4.9 Railroad Involvement

The CSX Rail Line passes under U.S. 1 approximately ½ mile north of Burlington Mills Road. The U.S. 1 and service/connector road bridges are being lengthened to not preclude the addition of future rail lines.

This rail corridor is referred to as the Raleigh and Gaston Rail Corridor and is eligible for listing on the National Register. Additional details are provided in [Section 5.1.4](#).

The Rail to Richmond Rail Study (R2R) High Speed Rail-line is currently underway. NCDOT is studying potential Transit Oriented Development (TOD) locations in conjunction with the rail study. One potential location is adjacent to the Burlington Mill interchange. No plans have been finalized for TOD locations.

The NCDOT Rail group has maintained open communication with Mallinckrodt Pharmaceuticals (located at U.S. 1 and Durant Road) due to their proximity to the rail corridor and the U-5307 project. Mallinckrodt is currently reviewing options for updating their site and has been in communication with CSX. No immediate implications for the U-5307 project are anticipated.

4.10 Work Zone Traffic Control and Construction Phasing

NCDOT has completed Work Zone Traffic Control Proof of Concept plans (October 2022) to identify any challenges with the maintenance of traffic during construction. The construction of the U.S.-1 mainline and mainline bridges will be completed through phased construction and will require temporary median cross overs to maintain traffic.

Additional investigations will be made during the Final Design phase of the project to properly size structures and right-of-way to provide adequate maintenance of traffic during construction.

4.11 Bicycle and Pedestrian Facilities

NCDOT has worked with the City of Raleigh, Town of Wake Forest, and CAMPO to determine the best locations for bicycle and pedestrian accommodations. Bicycle and pedestrian accommodations are not included along U.S. 1 (since it will be a fully controlled-access roadway) but are incorporated into the y-lines and service/connector roads as 5' sidewalks and 10' MUP/side paths.

Additionally, conversion of the temporary structure used for maintenance of traffic over the Neuse River during construction to a permanent, non-vehicular bridge, is recommended adjacent to the U.S. 1 mainline bridges.

U.S. 1 crosses the Neuse River Greenway, which is part of the City of Raleigh's Capital Area Greenway System and North Carolina's Mountains-to-Sea Trail. The length of the U.S. 1 replacement structures (determined as part of Concurrence Point 2A) includes an additional 65' of length to accommodate wildlife crossing underneath. This extended length serves a secondary benefit in that it also accommodates the Neuse River Greenway.

4.12 Utilities

Utilities along U.S. 1 include power (substations, high and low-voltage lines), fiber optic (multiple owners), natural gas, monitoring wells, cell towers, a nitrogen line, and water/sewer. NCDOT coordination with utility owners is ongoing. Advanced coordination prior to construction will reduce potential problems with utility relocations. Utility relocations will increase the right-of-way and easement impacts to property owners.

4.13 Landscaping

NCDOT has coordinated with the City of Raleigh and Town of Wake Forest regarding potential areas of landscaping. The Landscaping Design will be completed based on the Final Roadway Designs and completed through a separate landscaping contract following construction.

5 Environmental Effects of Proposed Action

5.1 Natural Resources

Multiple Natural Resource Technical Reports (NRTR) were completed for the U-5307 project due to expansions of the project study area. All information in this section is summarized from the initial *NRTR* (April 2016), *NRTR Update* (January 2020), and *NRTR Update* (March 2021). Additional Natural Resource tables are included in **Appendix C**.

5.1.1 Physical Resources

The study area lies in the Piedmont physiographic region of North Carolina. Topography in the project vicinity is comprised of gently rolling hills with narrow, level floodplains along streams. Elevations in the study area range from 132 to 388 feet above mean sea level. Land use in the project vicinity consists primarily of forested areas interspersed with residential and business development.

5.1.1.1 Soils

The Wake County Soil Survey identifies 57 soil types within the study area. See the full NRTRs for more details.

5.1.1.2 Water Resources

The study area is part of the Neuse River Basin (U.S. Geological Survey [USGS] Hydrologic Unit [HUC] 03020201). 94 potential streams were identified in the project study area and listed in **Appendix C, Tables 1 and 3**.

68 potential surface waters (ponds, tributaries, basins, treatment tanks, or wastewater tanks) were identified in the study area and shown in **Appendix C, Table 2**.

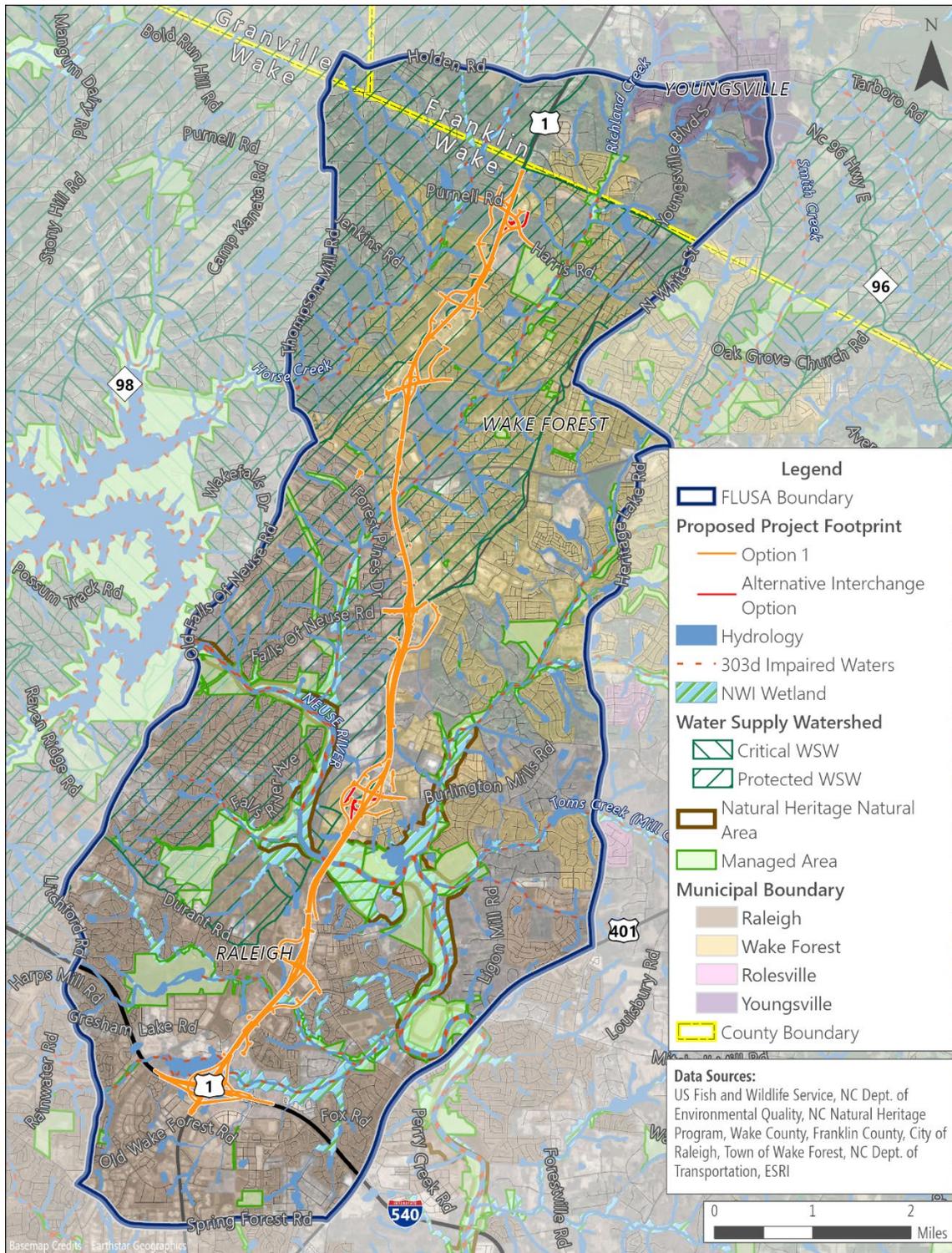
112 potential jurisdictional wetlands were identified in the project study area and listed in **Appendix C, Table 4**.

There are no Outstanding Resource Waters (ORW), High Quality Waters (HQW), or water supply watersheds (WS-I or WS-II) within 1.0 mile downstream of the study area. The North Carolina 2 Final 303(d) list of impaired waters identified Smith Creek within 1.0 mile downstream of features identified within the study area as impaired (for turbidity).

There are no benthic monitoring sites, Ambient Monitoring System (AMS) sites, or N.C. Stream Fish Community Assessment Program sites within 1.0 mile downstream of the project site.

The locations of natural resources are shown on **Figure 5-1**.

Figure 5-1. Natural Resources



5.1.2 Biotic Resources

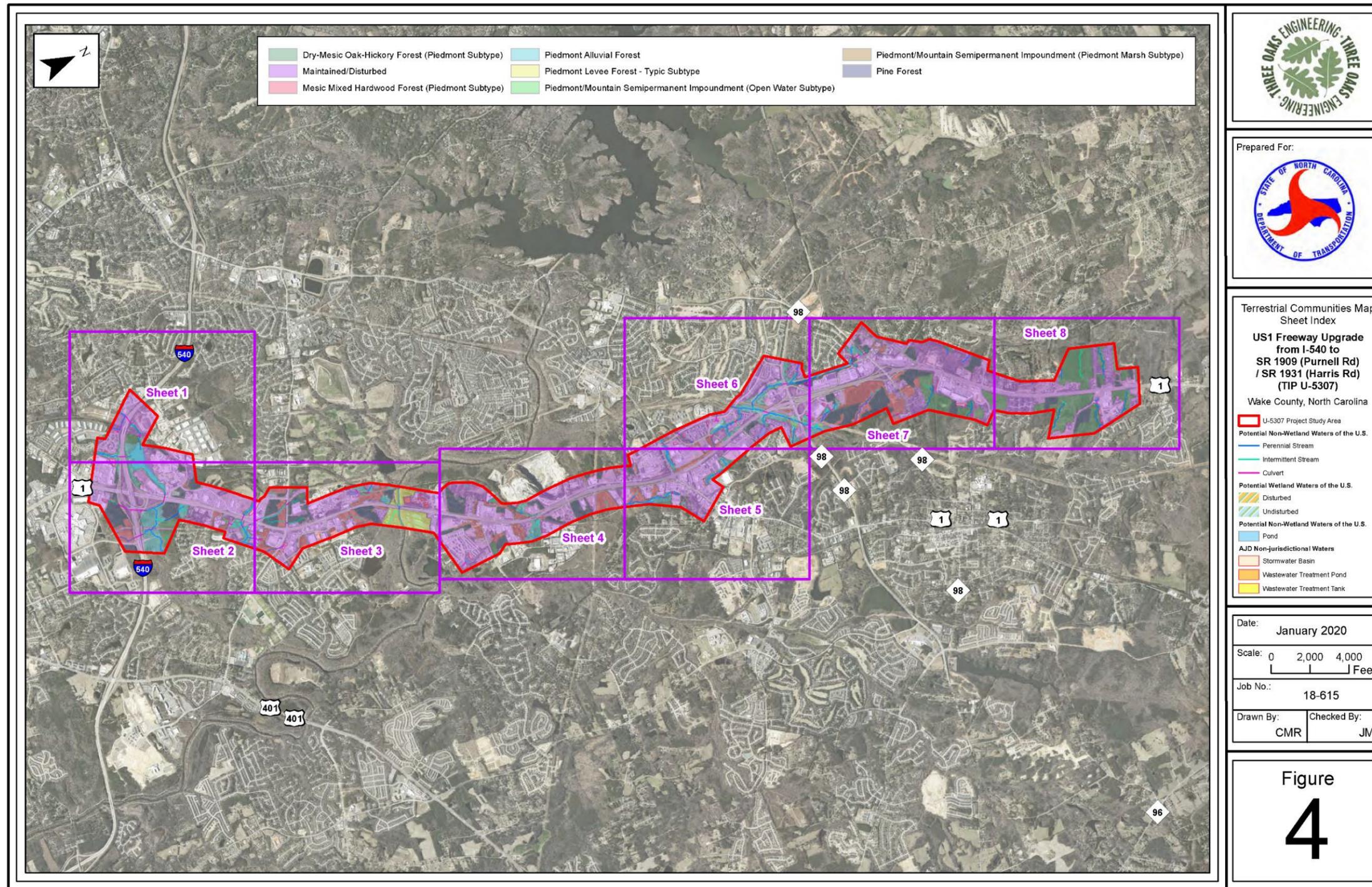
5.1.2.1 Terrestrial Communities

Eight terrestrial communities were identified in the study area and presented in the context of total coverage of each type in **Table 5-1**. **Figure 5-2** (NRTR Figure 4) shows the location and extent of these terrestrial communities. Detailed Terrestrial Community maps are shown in **Appendix C** (NRTR Figures 4-1 through 4-8).

Table 5-1. Coverage of Terrestrial Communities in the Study Area

Community	Dominant Species (Scientific name)	Coverage (ac.)
Maintained/Disturbed	Fescue (<i>Festuca</i> spp.) Sweetgum (<i>Liquidambar styraciflua</i>) Red maple (<i>Acer rubrum</i>)	2,710.8
Dry-Mesic Oak-Hickory Forest (Piedmont Subtype)	White oak (<i>Quercus alba</i>) Mockernut hickory (<i>Carya tomentosa</i>) Red maple (<i>Acer rubrum</i>)	307.3
Mesic Mixed Hardwood Forest (Piedmont Subtype)	White oak (<i>Quercus alba</i>) Tulip poplar (<i>Liriodendron tulipifera</i>) Poison ivy (<i>Toxicodendron radicans</i>)	322.6
Piedmont Alluvial Forest	Willow oak (<i>Quercus phellos</i>) Tulip poplar (<i>Liriodendron tulipifera</i>) Chinese privet (<i>Ligustrum sinense</i>)	325.1
Piedmont Levee Forest (Typic Subtype)	Green ash (<i>Fraxinus pennsylvanica</i>) Box elder (<i>Acer negundo</i>) Japanese honeysuckle (<i>Lonicera japonica</i>)	66.7
Piedmont/ Mountain Semipermanent Impoundment	Soft rush (<i>Juncus effusus</i>) Broadleaf arrowhead (<i>Sagittaria latifolia</i>) Cattail (<i>Typha latifolia</i>)	2.3
Pine Forest	Loblolly pine (<i>Pinus taeda</i>) Sweetgum (<i>Liquidambar styraciflua</i>) Japanese honeysuckle (<i>Lonicera japonica</i>)	344.0
	Total	4,078.7

Figure 5-2. Terrestrial Communities within the Project Study Area



Note – see Appendix C for sheets 1 through 8

5.1.3 Jurisdictional Issues

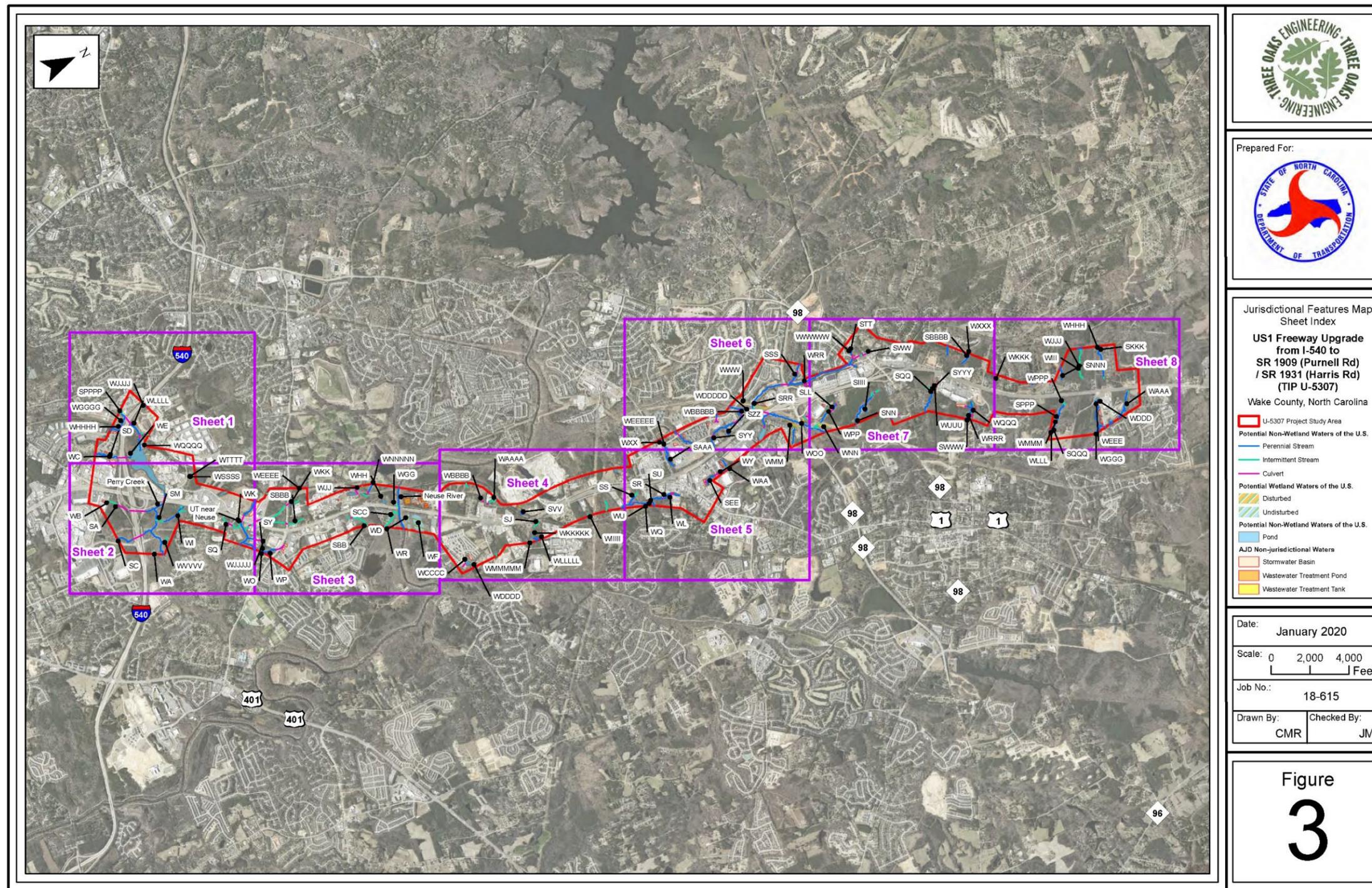
5.1.3.1 Clean Water Act Waters of the U.S.

109 potential jurisdictional streams were identified in the study area. North Carolina Division of Water Resources (NCDWR) stream identification forms and North Carolina Stream Assessment Method (NCSAM) forms are included in a separate PJD Package. All potential jurisdictional streams in the study area have been designated as warm water streams for the purposes of stream mitigation. Estimated stream impacts for the project alternatives are shown by project segment in **Appendix C, Tables 5, 7, 9, and 11.**

112 potential jurisdictional wetlands were identified within the study area. All wetlands in the study area are in the Neuse River Basin (USGS HUC 030201). United States Army Corps of Engineers (USACE) Wetland Determination forms and North Carolina Wetland Assessment Method (NCWAM) forms are included in a separate PJD Package. Estimated wetland impacts for the project alternatives are shown in **Appendix C, Table 6, 8, 10, and 12.**

The locations of these streams and wetlands are shown in **Figure 5-3** and detailed maps are shown in **Appendix C** (NRTR Figures 3-1 through 3-8).

Figure 5-3. Potential Jurisdictional Resources within the Project Study Area



Note – see Appendix C for sheets 1 through 8

5.1.3.2 Clean Water Act Permits

The anticipated permits for this project include a Section 404 of the Clean Water Act Individual Permit due to potential wetland and stream impacts. The USACE holds the final discretion as to what permit will be required to authorize project construction. If a Section 404 permit is required, then a Section 401 Water Quality Certification (WQC) from the NCDWR will be needed.

5.1.3.3 Coast Area Management Act Areas of Environmental Concern

Wake County is not under the jurisdiction of the Coastal Area Management Act (CAMA).

5.1.3.4 Construction Moratoria

The North Carolina Wildlife Resources Commission (NCWRC) identifies the Neuse River within the study area as anadromous fish habitat. Moreover, anadromous fish have been documented all the way to the base of the Falls Lake Dam. Therefore, it is anticipated that an inland Primary Nursery Area (PNA) and Anadromous Fish Spawning Areas moratorium will apply for the project between February 15th and June 30th.

5.1.3.5 N.C. River Basin Buffer Rules

This project is in the Neuse River basin (USGS Hydrologic Unit 03020201). Therefore, potential jurisdictional features associated with this project may be subject to Neuse River Riparian Buffer Rules administered by the North Carolina Department of Environmental Quality (NCDEQ). The NRTR includes lists of which features are subject to these buffer rules within the project study area expansions.

5.1.3.6 Rivers and Harbors Act Section 10 Navigable Water

The Neuse River within the project study area has not been designated by the USACE as a Navigable Water under Section 10 of the Rivers and Harbors Act.

5.1.3.7 Wetland and Stream Mitigation

Avoidance and Minimization of Impacts

The project is within the Neuse River Basin where buffer rules apply. Therefore, NCDOT's Design Standards for Sensitive Watersheds will be implemented during project construction.

Improvements proposed as part of the U-5307 have been evaluated based on potential impacts to streams, wetlands, and buffers and alignments have been determined that minimize these impacts to the best extent possible while still meeting the project purpose and need. Where feasible, the existing transportation network was expanded upon rather than constructing on new location to reduce impacts to all resources. Avoidance/minimization efforts so far have included:

- ❖ I-540/U.S. 1 interchange ramps were moved in to avoid stream impacts.
- ❖ Durant/Perry Creek Diamond Interchange – eliminated due to potentially high stream impacts).
- ❖ Durant/Perry Creek Parclo Interchange – eliminated due to potentially high stream impacts.
- ❖ Site 3 Bridge Crossing (**Table 4-2**) – decision to construct 300' bridge (rather than culvert) to minimize stream impacts.
- ❖ Site 6 Bridge Crossing (**Table 4-2**) – decision to construct 60' bridge (rather than culvert) to minimize stream impacts.
- ❖ Site 8 Bridge Crossing (Neuse River) (**Table 4-2**) – decision to extend bridges over the Neuse River by an additional 65' to provide for wildlife crossing.
- ❖ Site 11 Bridge Crossing (**Table 4-2**) – decision not to pursue this crossing due to stream impacts.
- ❖ Service roads are crossing as perpendicular to streams where possible.

Further minimization at the interchanges and along the service/connector roads will be evaluated as the project progresses.

Compensatory Mitigation of Impacts

The NCDOT will investigate potential on-site stream and wetland mitigation opportunities once a final decision has been rendered on the location of the preferred alternative. If on-site mitigation is not feasible, mitigation will be provided by North Carolina Division of Mitigation Services (NCDMS).

5.1.3.8 Endangered Species Act Protected Species

As of July 17, 2020, the United States Fish and Wildlife Service (USFWS) lists six federally protected species, under the Endangered Species Act (ESA), for Wake County. Three additional species are also proposed for listing for the county. The National Oceanic and Atmospheric Administration (NOAA) – National Marine Fisheries Service (NMFS) lists one federally protected species, Atlantic sturgeon, for Wake County. For each species, a discussion of the presence or absence of habitat within the five expanded study areas is included below along with an updated Biological Conclusion rendered for the entire project based on the results from the study area expansions. The species are listed in **Table 5-2**. Remaining surveys are set to be completed in 2023.

Table 5-2. Federally Protected Species Listed for Wake County

Scientific Name	Common Name	Federal Status	Habitat Present	Biological Conclusion
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic sturgeon	E	Yes	No Effect
<i>Noturus furiosus</i>	Carolina madtom	E	Yes	MANLAA
<i>Necturus lewisi</i>	Neuse River waterdog	T	Yes	MANLAA
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	Yes	No Effect
<i>Fusconaia masoni</i>	Atlantic pigtoe	T	Yes	MANLAA
<i>Alasmidonta heterodon</i>	Dwarf wedgemussel	E	Yes	MANLAA
<i>Rhus michauxii</i>	Michaux's sumac	E	Yes	Unresolved
<i>Perimyotis subflavus</i>	Tri Colored Bat	PE	Yes	Unresolved

E – Endangered; PE – Proposed Endangered; PT – Proposed Threatened; T – Threatened
MANLAA – May Affect, Not Likely to Adversely Affect¹¹

5.1.3.9 Northern Long-Eared Bat (NLEB)

The USFWS has developed a Programmatic Biological Opinion (PBO) in conjunction with the Federal Highway Administration (FHWA), USACE, and NCDOT for the NLEB (*Myotis septentrionalis*) in eastern North Carolina. The PBO covers the entire NCDOT program in Divisions 1-8, including all NCDOT projects and activities. The programmatic determination for NLEB for the NCDOT program is “May Affect, Likely to Adversely Affect.” The PBO provides incidental take coverage for NLEB and will ensure compliance with Section 7 of the Endangered Species Act for all NCDOT projects with a

¹¹ All species in **Table 5-2** noting a MANLAA Biological Conclusion are covered under programmatic agreements with U.S. Fish and Wildlife Service. NCDOT agrees to the construction measures outlined in the Programmatic Biological Opinions, resulting in automatic concurrence. NCDOT will make payment to the N.C. Non-game Aquatic Resource Fund to satisfy Section 7 for the species.

federal nexus in Divisions 1-8, which includes Wake County, where the project is located. This level of incidental take is authorized from the effective date of a final listing determination through December 31, 2030.

5.1.3.10 Tricolored Bat

On September 14, 2022, the USFWS announced a proposal to list the tricolored bat (*Perimyotis subflavus* - PESU) as endangered under the Endangered Species Act. Given the proposal to list PESU as Federally Endangered, NCDOT and its federal partners, FHWA and USACE are initiating a conference programmatic consultation to address impacts to this species. USFWS has not provided an official effective listing date, but it is anticipated to occur in the second half of 2023. Upon listing, USFWS is expected to provide habitat descriptions and an area of influence/distribution range for PESU. When this information is provided, it will help to inform NCDOT's determinations on habitat that could be impacted by NCDOT actions.

5.1.3.11 Bald Eagle and Golden Eagle Protection Act

The bald eagle is protected under the Bald and Golden Eagle Protection Act and enforced by the USFWS. Habitat for the bald eagle primarily consists of mature forests in proximity to large bodies of open water for foraging. Large dominant trees are utilized for nesting sites, typically within 1.0 mile of open water.

A desktop-GIS assessment of the study area, as well as the area within a 1.13-mile radius of the original project limits and 2018 expansion, was performed on September 5, 2018, using the most currently available ortho-imagery. Water bodies large and sufficiently open enough to be considered potential feeding sources were identified. Since foraging habitat was present within the review area, a survey of the original study area and the area within 660 feet of the project limits was conducted as part of the November 2019 NRTR. Review of the five study area expansions was completed on February 8, 2021. No eagles or nests were observed during either survey effort. A review of the January 2021 North Carolina Natural Heritage Program dataset revealed no known occurrences of this species within 1.0 mile of the study area. Due to the lack of nests, individuals, or known occurrences, and the minimal impact anticipated, it has been determined that this project will not affect this species.

5.1.4 Cultural Resources

The information presented in this section is summarized from the *Historic Architecture and Landscapes Effects Required Forms* (June 2017 and November 2018), *Historic Structures Survey Report* (September 2018), *Historic Architecture and Landscapes Assessment of Effects Form* (November 2022), *Archaeological Survey Required Form* (August 2017), and three additional concurrence letters regarding archaeology (from June 2021, May 2022, and June 2022).

5.1.4.1 Historic Architectural Resources

The initial historic architecture survey identified 104 properties over fifty years of age with the Area of Potential Effect. Fourteen resources warranted intensive evaluation of eligibility for the National Register. Three of these properties are on the National Register and one is listed as eligible for the National Register. The state Historic Preservation Office (HPO) concurred with these findings and details regarding each property and effect determination (from the 10/27/2022 Effects Meeting) are included in **Table 5-3**. **Figure 5-4** shows the location of each property in relation to the project corridor.

Table 5-3. Historical Architectural Resources and Effects

Property Name	Effects Determination	Commitments
Powell House (NR, Site WA0040)	No Adverse Effect	<ul style="list-style-type: none"> ❖ NCDOT to provide driveway access to the historic property off Stroller Ridge Drive ❖ NCDOT to protect a triangular piece of land adjacent to the historic property
Raleigh and Gaston Rail Corridor (Eligible for NR)	No Effect	<ul style="list-style-type: none"> ❖ None
Purefoy Dunn Plantation (NR, Site WA0221)	No Effect	<ul style="list-style-type: none"> ❖ None
Wakefields/Sutherland (NR, Site WA0024)	No Adverse Effect	<ul style="list-style-type: none"> ❖ Retaining wall along Capital Boulevard to be a soil nail wall and design selected by property owner ❖ Landscaping and fence style behind the wall to be coordinated with property owner ❖ Cul-de-sac of Wake Union Church Road to be eliminated behind the historic property

5.1.4.2 Archaeological Resources

Forty archaeological sites and cemeteries were identified by the archaeological survey, of which two sites were determined to have been contributing resources to historic properties in this project's

area of potential effects. One cemetery (31WA2365) is a contributing element of the Powell House historic property, which is listed in the National Register of Historic Places, and one archaeological site (31WA2385) is recommended as a contributing element of the NRHP-listed Wakefield Plantation under Criterion D in the area of historic archaeology. The remaining archaeological sites and cemeteries are not considered eligible for listing in the National Register. The State Historic Preservation Office (HPO) concurred with these findings.

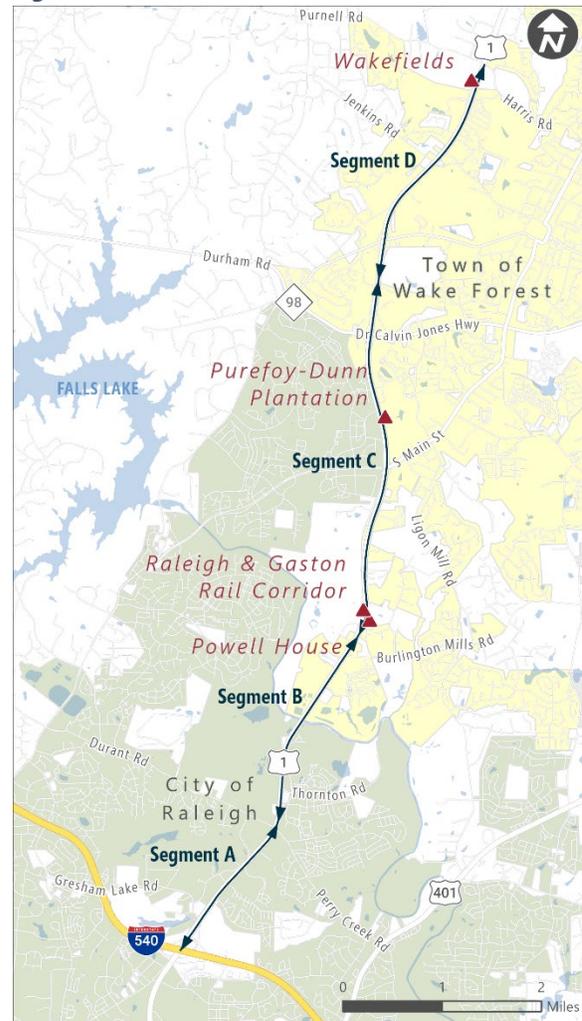
The preliminary design plans for the proposed project show that impacts to the National Register-listed Wakefields Plantation will be limited to the installation of control of access fencing along the property boundary adjoining U.S. 1. The proposed impact area extends approximately 20' into the Wakefields property along this boundary. The archaeological component of Wakefields (site 31WA2385) is not considered to be fully delineated; however, the area of potential impacts is unlikely to contain significant archaeological materials given its limited extent.

If needed due to design changes, NCDOT will coordinate with HPO for additional review. The above comments are made pursuant to Section 106 of the National Historic Preservation Act and the Advisory Council on Historic Preservation's Regulations for Compliance with Section 106 codified at 36 CFR Part 800.

5.1.4.3 Tribal Resources

NCDOT reached out to the Catawba Indian Nation as part of the NCDOT Tribal Coordination Protocol (January 2020). The Catawba Indian Nation had no immediate concerns regarding the traditional cultural properties, sacred sites or Native American archaeological sites within the boundaries of the project areas. However, NCDOT is to notify the Catawba Indian Nation if Native American artifacts and/or human remains are located during the ground disturbance phase of the project.

Figure 5-4. Cultural Resources



5.1.5 Section 4(f)/6(f) Resources

5.1.5.1 Section 4(f)

Section 4(f) of the U.S. Department of Transportation Act stipulates that the FHWA and other U.S. Department of Transportation agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless:

- ❖ There is no feasible and prudent avoidance alternative to the use of land; and the action includes all possible planning to minimize harm to the property resulting from such use; or
- ❖ The Administration determines that the use of the property will have a *de minimis* impact. A *de minimis* impact is one that, after considering avoidance, minimization, mitigation and enhancement measures, results in no adverse effect to the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f).

The same four properties in Historic Architectural Resources ([Section 5.1.4.1](#)) are also determined to qualify as Section 4(f) properties. In addition, a fifth property, Joyner Park, qualifies as a Section 4(f) property. **Table 5-4** includes a list of properties and Section 4(f) Impact Determinations.

Table 5-4. Section 4(f) Resources and Impact Determinations

Property Name	Impact Determination	Description of Use/Impact
Powell House (NR, Site WA0040)	<i>De Minimis</i>	❖ Project requires removal of driveway access to U.S. 1; alternative driveway access will be created off Stroller Ridge Drive
Raleigh and Gaston Rail Corridor (Eligible for NR)	None	❖ None
Purefoy-Dunn Plantation (NR, Site WA0221)	None	❖ None
Wakefields/Sutherland (NR, Site WA0024)	<i>De Minimis</i>	❖ Project requires some right of way along the front of the property; mitigation will include construction of retaining wall along Capital Boulevard; landscaping and fence style behind the wall
Joyner Park	None	❖ None; the project will not impact the property

5.1.5.2 Section 6(f)

Coordination was completed with N.C. Parks and the Town of Wake Forest to determine restrictions associated with Joyner Park in March 2022. The park was awarded two Land and Water Conservation Fund grants for property acquisition and Phase I development which resulted in specific deed restrictions related to property impacts. To avoid potential Section 6(f) impacts, the project design

was revised to stop the 10' MUP/side path along the south side of Harris Road at the Joyner Park property line. Additional coordination and design revisions may continue through final design if new information is made available.

5.1.6 Community Resources

Information in this section is summarized from the *U-5307 Community Impact Assessment Short-Form* (September 2021) and *NCDOT Integrated Mobility Division Complete Streets Review Assessment* (May 2022).

Community facilities in and around the project study area are shown in **Figure 5-5**. There are several different demographic groups ranging in income levels and English-speaking abilities. Hispanic communities are located along the corridor, and several churches nearby hold services in Spanish. School buses were observed using U.S. 1 throughout the afternoon, as there are many residential areas and schools between Raleigh and Wake Forest that rely on this corridor. Public involvement activities have been tailored to reach the various communities along U.S. 1.

Several specialty medical offices and wellness centers are located along U.S. 1 as well as Rex Healthcare of Wakefield, located in the northwestern quadrant of the interchange of U.S. 1/Falls of Neuse Road/U.S. 1A (South Main Street). Several schools are nearby, including Richland Creek Elementary School, Wakefield 9th Grade Center, Forest Pines Elementary School, Endeavor Charter School, preschools, and private schools associated with churches.

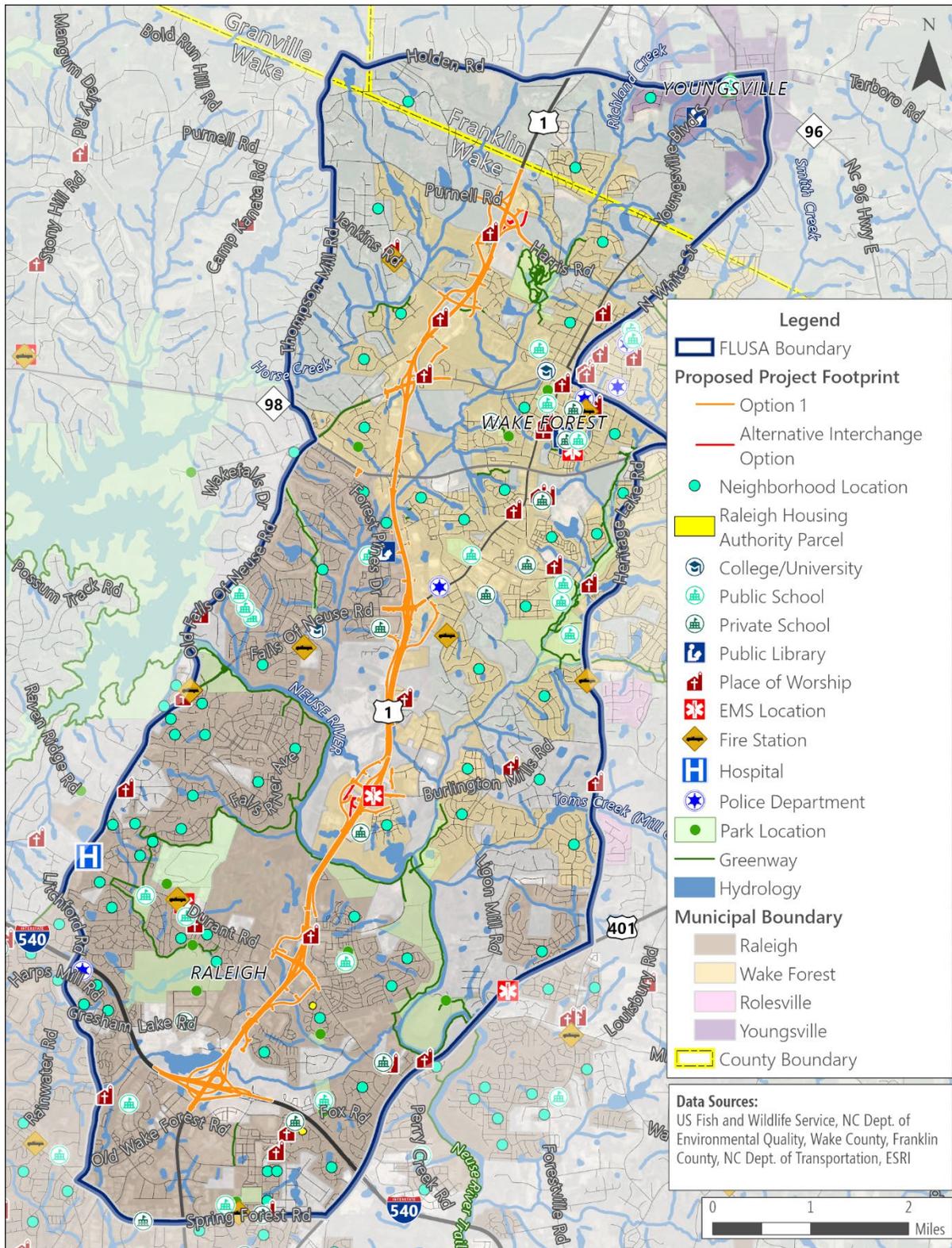
5.1.6.1 Places of Worship

Multiple places of worship are located throughout the U.S. 1 corridor, including:

- ❖ Casa de Su Presencia (7129 Capital Boulevard)
 - Casa de Su Presencia is situated between Cheviot Hills Drive and Capital Hills Drive north of Gresham Lake Road. Existing access is via Cheviot Hills Drive and U.S. 1. Potential access impacts have been discussed with church leaders and property owners and have been mitigated for. Access will be provided via Capital Hills Drive. See [Section 6.1.4](#) for additional information.
- ❖ Celebration Church (8700 Capital Boulevard)
 - Celebration Church is located at the intersection of U.S. 1 and Thornton Road which will lose connectivity to U.S. 1. Substantial right-of-way (ROW) impacts are anticipated to structures and parking on this property. The NCDOT Project Team has been in coordination with church leaders to discuss potential impacts.

- ❖ Living Word Family Church (10520 Star Road)
 - Living Word Family Church is located east of U.S. 1 along Star Road. Access will be maintained along Star Road which will serve as a service/connector roadway. Some ROW and/or easement impacts are anticipated to this property.
- ❖ St. John's Episcopal Church (834 Durham Road)
 - St. John's Episcopal Church is located east of U.S. 1 along the north side of N.C. 98 Business. Access will be maintained along N.C. 98 Business. Some ROW and/or easement impacts are anticipated to this property.
- ❖ Wake Forest Presbyterian Church (12605 Capital Boulevard)
 - Wake Forest Presbyterian Church is located directly along the west side of U.S. 1 south of Jenkins Road. New access will be provided by Wake Union Church Road Extension to the rear of the property. Some ROW and/or easement impacts are anticipated to this property.
- ❖ Wake Union Baptist Church (13345 Wake Union Church Road)
 - Wake Union Baptist Church and its cemetery are located south of Purnell Road along the west side of U.S. 1. Existing access will be maintained but access to U.S. 1 will be required to use Wake Union Church Road Extension to N.C. 98 Business. No ROW and/or easement impacts are anticipated to this property.

Figure 5-5. Notable Human Environment and Community Resources



5.1.6.2 Relocations

The information regarding anticipated relocations is summarized from the *U-5307 EIS Relocation Reports* (November 2021).

The project would result in the acquisition and/or relocation of businesses along the project corridor due to the widening of U.S. 1, the removal of driveways along U.S. 1, and the introduction of interchanges, grade separations, and service/connector roads. Where feasible, retaining walls have been incorporated into the project design to minimize the construction footprint and subsequently the number of homes and businesses directly impacted. Anticipated relocations by segment are detailed in **Table 5-5**.

Table 5-5. Anticipated Relocation Impacts by Project Segment (per June 2021 Relocation Report)

Displacement Type	Segment A Gresham Lake, Option 1	Segment A Gresham Lake, Option 2	Segment A Gresham Lake, Option 3	Segment A Gresham Lake, Option 4
Residential Displacements	4 (1 minority)	4 (1 minority)	4 (1 minority)	4 (1 minority)
Commercial Displacements	11 (1 minority)	12 (1 minority)	11 (1 minority)	12 (1 minority)
Non-Profit Displacements	1	1	1	1

Displacement Type	Segment B with Burlington Mills Road Option A	Segment B with Burlington Mills Road Option B
Residential Displacements	8 (1 minority)	18 (2 minority)
Commercial Displacements	16	16
Non-Profit Displacements	0	0

Note – ROW impacts shown assuming no service/connector road bridge over the Neuse River; however, no additional ROW impacts anticipated as part of construction of that structure.

Displacement Type	Segment C
Residential Displacements	2
Commercial Displacements	0
Non-Profit Displacements	0

Displacement Type	Segment D Purnell Road/Harris Road Option 1	Segment D Purnell Road/Harris Road Option 2
Residential Displacements	20 (4 minority)	20 (4 minority)
Commercial Displacements	7	7
Non-Profit Displacements	0	0

Public Law 91-646, *the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, as amended, commonly called the Uniform Relocation Act, is the primary law for acquisition and relocation activities on federal or federally assisted projects. The law provides uniform policy and procedures for the acquisition of real property by all agencies that receive financial assistance for any program or project of the United State Government. Because Federal funds are used in the project, the Uniform Relocation Act applies.

The NCDOT's relocation assistance program is based on *the Uniform Relocation Assistance and Real property Acquisition Policies Act of 1970*, as amended, and Title 49 CFR Part 24. The NCDOT Right of Way Unit is responsible for acquisition of land and right of way for the construction and improvements of all roads and highways that are part of the State Highway System. The Right of Way Unit ensures that persons displaced as result of a project are treated fairly, consistently, and equitably so that such persons will not suffer disproportionate impacts as a result of projects designed for the benefit of the public as a whole. **Appendix E** contains the Relocation Reports for this project.

All relocation services and benefits are administered without regard to race, color, national origin, or sex in the compliance with *Title VI of the Civil Rights Act* (42 USC 2000d, et seq), per NCDOT's Title VI Policy Statement.

5.1.6.3 Title VI and Environmental Justice

Census data was reviewed using the 2020 NCDOT Demographic Snapshot Tool and 2014-2018 American Community Survey Data as part of the Community Impact Assessment (August 2021). Census data indicated a notable presence of minority and low-income populations meeting the criteria for Environmental Justice (EJ) within the Demographic Study Area and minority and low-income communities were observed within the Direct Community Impact Area during the field visit and were noted by local planners.¹²

The following Census Tract (CT) Block Groups (BG) exceed NCDOT's thresholds for notable EJ minority populations by exceeding 50 percent of the total BG population threshold: CT 540.15, BG 1; CT 540.18, BG 2; CT 540.14, BG 1; CT 540.14, BG 2; CT 540.14, BG 3.

The following CT BGs exceed NCDOT's threshold for notable EJ low-income populations by exceeding the respective county percentage of "Below Poverty Level," "Under 50 Percent of Poverty

¹² *The Direct Community Impact Area includes the area surrounding the project likely to be directly impacted by the U-5307 project. The Demographic Study Area includes the Census Block Groups adjacent to this Direct Community Impact Area.*

Level”, and/or “Between 100 Percent and 149 Percent of Poverty Level” by five or more percentage points: CT 542.06, BG 2, CT 540.15, BG 2, and CT 540.18, BG 2.

CT 540.14 BG 2 and 3 both exceed NCDOT’s threshold for notable EJ low-income populations by exceeding 25 percent of the total BG population threshold for “Between 100 Percent and 149 Percent of Poverty Level” and “Below Poverty Level”, respectively.

Notably adverse community impacts are anticipated with this project but appear to affect all populations equivalently; thus, impacts to minority and low-income populations do not appear to be disproportionately high and adverse. Benefits and burdens resulting from the project are anticipated to be equitably distributed throughout the community. **No disparate impacts are anticipated under Title VI and related statutes.**

Potential community impacts were initially evaluated as part of the Community Characteristic Report in 2016 and further analyzed as part of the Community Impact Assessment in August 2021. Due to the presence of Title VI and EJ populations in the project vicinity, NCDOT has engaged with meaningful public involvement in satisfying the requirements of both Executive Order 13166 and 12898. Vital documents have been translated to Spanish and meaningful language access has been determined and adhered to by NCDOT Public Involvement. Additional small group meetings have been held with groups/communities where more notable impacts are possible; these include Circle Drive neighborhood and Casa de Su Presencia Church. These outreach efforts are detailed in [Section 6.1](#).

5.1.6.4 Bicycle and Pedestrian Facilities

Community Impact Assessment Evaluation

No bicyclists, pedestrians or worn paths were observed in the project vicinity. Some pedestrians were observed in single and multi-family residential developments away from the project corridor, but no bicycle or pedestrian activity was observed along or adjacent to the U.S. 1 corridor during a site visit on May 6, 2020. No worn foot paths were noted in the vicinity of U.S. 1.

Planner input from the Town of Wake Forest noted there is bicycle and pedestrian activity within the project area, and walkers, runners and cyclists use U.S. 1 to access employment and recreation. Based on additional project coordination and site visit observations, it appears that these users are accessing walking, running, and cycling opportunities (parks, greenways, Neuse River, etc.) via driving.

Due to the minimal bicycle and pedestrian activities present on the roadways in the project area, any barriers or construction activity is not likely to notably impact accessibility. Some temporary access impacts from overhead bridge construction may impede activity along the greenway. Overall,

the project's completion is expected to improve the bicycle and pedestrian network and to increase bicycle and pedestrian activity.

The NCDOT will coordinate with local officials, NCDOT Integrated Mobility Division (IMD), and NCDOT Work Zone Traffic Control to evaluate the inclusion of temporary bicycle and/or pedestrian accommodations during construction. The Pedestrian Accommodation and Count Screening Tool was completed in July 2022. It found that "Human environmental or social impacts may warrant a higher level of accommodation regardless of pedestrian volumes.

Complete Streets Review Assessment (CSRA)¹³

As part of project development, NCDOT IMD conducted a review of the proposed bicycle and pedestrian accommodations in May 2022 using the Complete Streets Project Sheet, preliminary designs, and Public Meeting Maps (from the December 2021 Public Meeting) supplied by the Project Team. Based on this evaluation, IMD recommended sidewalks as the preferred facility for pedestrians along roadways with operating speeds of 35 mph or higher. Since there may be medium demand for use of these facilities, IMD recommended considering an expanded buffer as well.

With current operating speeds, demand estimates, and daily traffic volumes, the preferred bicycle facility is a separated bike lane or shared-use path. Where bicycle and pedestrian demand overlaps, shared use paths can be used in place of separate bicycle lanes where space is limited, and both walking and bicycling uses are present, and volumes are relatively low. Should bicycle and/or pedestrian volumes increase over time, a separate bicycle path may be necessary to provide separation. The Project Team should utilize FHWA's shared use path level of service calculator in conjunction with local government agency (LGA) coordination to determine bicycle and pedestrian volumes and ensure the effectiveness of a shared use path. Planning documents indicate there is likely more of a need for facilities than able to determine virtually, (as a site visit wasn't made for that purpose) .

Shared roadways and paved shoulders are not considered formal pedestrian or bicycle facilities, and Project Managers and Leads should consult with the LGA and review for safety needs when considering these options.

¹³ This section is paraphrased from NCDOT IMD's initial review of proposed bicycle and pedestrian facilities completed on May 17, 2022. Additional coordination is pending finalizing preliminary design plans for the Public Hearing in June 2023. Once complete, these designs will be coordinated with IMD for a Stage III review of proposed facilities.

5.1.7 Business and Economic Effects

The preferred alternative will substantially alter access to businesses throughout the project area. Since the corridor is proposed to be upgraded to a freeway with interchange access only, any existing development that currently accesses U.S. 1 directly will experience changes in access.

While the U-5307 project is expected to improve overall access and connectivity throughout the U.S. 1 corridor, a number of business/commercial property relocations are anticipated. Relocations are predominantly expected in the areas adjacent to proposed intersection to interchange conversions or interchange improvements. Detailed relocation estimates are previously provided in **Table 5-5**.

The preferred alignment of the new service/connector road along U.S. 1 northbound north of I-540 is currently planned to extend through several commercial developments around Jacqueline Lane and Homestead Drive before extending north to Perry Creek Road.

North of Durant Road, access to Mallinckrodt Pharmaceuticals is proposed to be cut off from U.S. 1 at Thornton Road and connected to Durant Road via a new service/connector road.

Wadford Drive is proposed to extend north from the Perry Creek Road area along U.S. 1 northbound providing access to River Haven Apartments. The extension of the service/connector road across the Neuse River is tentative pending additional local and agency coordination. Property access will remain regardless so whether or not this section of service/connector road is constructed will only impact routes taken to/from U.S. 1 and adjacent interchanges. No notable community impacts, positive or negative, are anticipated with or without construction of the new service/connector road crossing over the Neuse River.

Interchange construction at U.S. 1/Burlington Mills Road includes service/connector road construction extending south along the east side of U.S. 1, potentially connecting with the above noted service/connector road extending north from Perry Creek Road. Construction of the interchange at Burlington Mills Road is expected to be among the most impactful improvements associated with the U-5307 project. There are currently two proposed configurations at this interchange and access impacts and property relocations will be dependent on which alternative is selected. Option A (standard diamond) results in permanent ROW impacts to commercial developments in all four quadrants, including the Crossroads Ford auto dealership. The skewed partial cloverleaf (Option B) reduces commercial impact directly west of U.S. 1 but has similar commercial impacts in the northeast and southeast quadrants, including a strip center and gas station.

North of Falls of Neuse/U.S. 1A (South Main Street), local street intersections with U.S. 1 are proposed to be redirected to existing service/connector roads and parallel routes which will impact

travel patterns. This is not expected to result in substantial impacts to businesses in this area since two interchanges are already constructed along this segment.

Business access impacts north of N.C. 98 Business are expected to be less substantial than south of N.C. 98 Business. The additional service/connector roads, interchange modifications, and intersection to interchange upgrades are likely to have notable short-term impacts during construction; however, the overall connectivity and accessibility will be improved resulting in improvements to access in the long-run.

5.1.8 Indirect and Cumulative Effects

The project may alter travel patterns, reduce travel time, affect access to properties in the area, or open areas for development or redevelopment. Due to the potential transportation impact-causing activities, this project may influence nearby land uses or stimulate growth. A detailed indirect and cumulative effects study was completed in October 2016 and provides a discussion of the transportation impacts causing activities. Based on the recommendations of that study as well as additional coordination with NCDOT Community Studies, a Land Use Scenario Assessment (LUSA) was completed in November 2021 to evaluate the potential for indirect land use effects as a result of the project.

5.1.9 Land Use

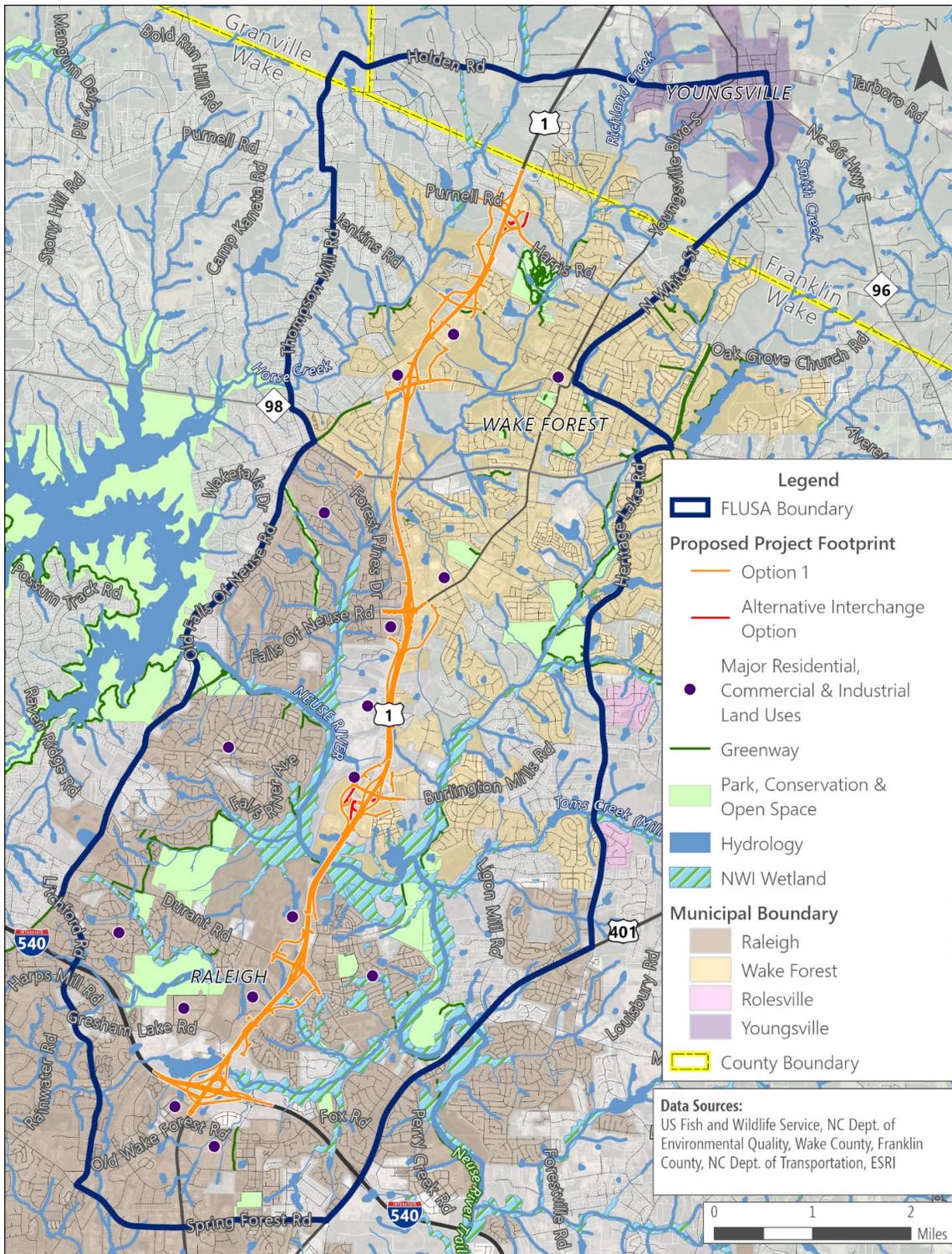
The information in this section is summarized from the *U-5307 Land Use Scenario Assessment* (November 2021). The area of analysis for the report, the Future Land Use Study Area, is included as **Figure 5-6**.

Summary of Study, Time Horizon, and Notable Features

The time horizon for this analysis is through the year 2045. This time frame is consistent with the adopted Metropolitan Transportation Plan (MTP) for the Triangle Region. The Capital Area Metropolitan Planning Organization (CAMPO) is the only planning jurisdiction that encompasses the entire Future Land Use Study Area (FLUSA) with limits extending through Wake and Franklin Counties, the Town of Wake Forest, and the City of Raleigh, as well as the Towns of Rolesville and Youngsville.

Other local plans adopted by Wake County, Town of Wake Forest, and City of Raleigh extend through horizon year 2030; however, several of these plans are undergoing updates at this time. It should be noted that the design year for STIP Project U-5307 is 2040. It was determined that this variation does not have a notable impact on the findings of this report related to potential impacts on land use and development.

Figure 5-6. LUSA Future Land Use Study Area



Notable Features

- ❖ *Residential developments* – multiple single-family subdivisions and multi-family developments (townhomes and apartment complexes) are located throughout the FLUSA.
- ❖ *Natural Resources* – Falls Lake borders the western edge of the FLUSA and empties into the Neuse River which flows southeast through the FLUSA. Five streams/tributaries of the Neuse River are present within the FLUSA plus several small lakes and ponds. The Durant Nature Preserve is located near Gresham Lake Road and I-540.
- ❖ *Commercial/Industrial Developments* – Substantial industrial development is located along Gresham Lake Road, north of Durant Road/Perry Creek Road, and north of Burlington Mills Road. Several key businesses include Mallinckrodt Pharmaceuticals, Hanson Aggregates quarry, and multiple auto dealerships (major brands and small, independent sellers).
- ❖ Most K-12 public/private schools in the FLUSA are located along cross streets. Other important educational institutions include Care One Health Training Institute and the Southeastern Baptist Theological Seminary. Multiple places of worship are present within the FLUSA. Locations near the U.S. 1 corridor include Casa de Su Presencia, The Summit Church, Celebration Church, Living Word Family Church, Wakefield United Methodist Church, St John’s Episcopal Church, Wake Forest Presbyterian Church, and Wake Union Baptist Church.
- ❖ Medical offices are located throughout the FLUSA. Rex Healthcare of Wakefield includes an emergency room at the U.S. 1 and Falls of Neuse Road/U.S. 1A (S Main Street) intersection.
- ❖ Transit Routes in the FLUSA include a combination of local routes and express routes operated by GoTriangle and GoRaleigh transit services.

Summary of Growth Trends Occurring and Expected, Development Regulations

N.C. Office of State Budget and Management (OSBM) data indicates annualized population growth rates of 1.15 percent and 1.25 percent from 2010 to 2019 for the Raleigh and Wake Forest areas of Wake County, respectively. Wake County falls in the middle with nearly a 1.2 percent annualized growth rate.

Projections estimate the Wake County population will increase from approximately 1.1M in 2019 to over 1.6M people in 2045, a gross increase of 50 percent, or 1.6 percent annualized. Franklin County, which covers the northern extents of the FLUSA, is projected to increase in population from approximately 70,000 to nearly 100,000 over this same time period, or 1.4 percent annualized. Historical data indicates the FLUSA will follow trends similar to the counties as a whole, which was also supported by local planner input.

N.C. Department of Commerce employment projections for the Raleigh-Durham Region estimate employment growth through 2028 to be approximately 0.9 percent for all industries. The FLUSA is generally expected to follow similar patterns.

There are multiple county or municipal plans concerning development patterns and regulations throughout the FLUSA. The City of Raleigh's *2030 Comprehensive Plan Update* notes the need for economic development along the U.S. 1 corridor north of I-540 as well as the need to encourage mixed-use, higher-density, development. *PLANWake* provides a framework for future planning and development patterns throughout Wake County. The *CAMPO 2045 Metropolitan Transportation Plan* discusses the importance of pairing land use policies and transportation investments and outlines projects consistent with this approach.

Indirect Effects Matrix

This section summarizes the results of the Indirect Effects Matrix (**Exhibit 5-1**), noting the primary factors that affected the result.

- ❖ The "Scope of Project" is a High Concern since STIP project U 5307 proposes to widen 10.5 miles of U.S. 1 in addition to new interchange and service road construction.
- ❖ "Travel Time Savings" along the project corridor are anticipated to exceed 10 minutes resulting in High Concern.
- ❖ "Forecasted Population Growth" is a Medium Concern with Wake County and Franklin County annualized population growth rates of 1.6 and 1.4 percent, respectively, being indicative of trends within the FLUSA.
- ❖ "Forecasted Employment Growth" is a Medium-Low Concern since the Raleigh-Durham Region annualized employment growth rate through 2028 is just under one percent.
- ❖ "Available Land," or land that is undeveloped or underdeveloped, is considered to be a Medium-Low Concern after applying parcel-to-owner weighting.
- ❖ Water and sewer services are only provided to incorporated areas of Raleigh, Wake Forest, and Youngsville. Therefore, "Water/Sewer Availability" is a Medium-High Concern.
- ❖ The "Market for Development" is a Medium-High Concern with local stakeholder input indicating substantial residential and commercial development activity throughout the FLUSA.
- ❖ "Public Policy" is a Medium-Low Concern since local policies appear to be more stringent regarding growth patterns and land uses in the FLUSA.
- ❖ "Notable Natural Environmental Features" is a Medium-High Concern with the presence of the Neuse River and associated resources.

Exhibit 5-1. Indirect Effects Matrix

Rating	Scope of Project	Travel Time Savings	Forecasted Population Growth	Forecasted Employment Growth	Available Land	Water/Sewer Availability	Market for Development	Public Policy	Notable Natural Environmental Features	Result	
More Concern	High	> 10 minute travel time savings	> 3% annualized population growth	> 3% annualized employment growth	40% or greater of available land	Services available (80 - 100% of FLUSA served)	Development Activity Abundant	Less stringent; no growth management	Notable Feature(s): Abundant / More Sensitive		
High	X	X								Land Use Scenario Assessment Warranted	Land Use Scenario Assessment Required
Medium-High						X	X		X		
Medium			X								Coordinate with CS
Medium-Low				X	X			X			
Low											
Less Concern	Low	No travel time savings	No population growth or decline	No employment growth or decline	0 - 9% of available land	Limited or no service available now or in future (0 - 20% of FLUSA served)	No Development Activity	More stringent; growth management	Notable Feature(s): Minimal / Less Sensitive		

Land Use Scenario Assessment Matrix

The Land Use Scenario Assessment Matrix resulted in an “Indirect Land Use Impacts Not Likely” finding.

The Build scenario is not expected to substantially alter the “Development Intensity” or “Future Shift of Regional Employment Growth”. If built, the project may result in a slight increase in the “Scope of Development” by improving access to several large parcels in the FLUSA. The project may also improve mobility and reduce travel times in the U.S. 1 corridor which may result in a larger increase in “Future Shift of Regional Population Growth” as part of the Build scenario. However, Wake County has land use regulations similar to the City of Raleigh and Town of Wake Forest so “Pressure for Land Development Outside Regulated Areas” and “Planned/Managed Land Use and Impacts” are not expected to vary between Build and No-Build scenarios.

Exhibit 5-2. Land Use Scenario Assessment Matrix

Rating	Scope of Development	Development Intensity	Future Shift of Regional Population Growth	Future Shift of Regional Employment Growth	Pressure for Land Development Outside Regulated Areas	Planned / Managed Land Use and Impacts	Result	
More Concern	40% or Greater Change in Developed Land within the PDAs	Higher Development Intensities Anticipated	Strong Attraction of Development in the PDAs	Strong Attraction of Development in this Area	All PDAs are Outside a Regulated Area	Land Development and Stormwater Management Goals Not Set		
High								Indirect and Cumulative Effects Summary Required
Medium-High		No-Build and Build Scenarios	Build Scenario					
Medium				Build Scenario				
Medium-Low	Build Scenario		No-Build Scenario	No-Build Scenario			Indirect Land Use Impacts Not Likely	
Low	No-Build Scenario				No-Build and Build Scenarios	No-Build and Build Scenarios		
Less Concern	0-9% Change in Developed Land within the PDAs	No Current or Proposed Development Anticipated	No Population Shift Likely	No Employment Shift Likely	All PDAs are Inside a Regulated Area	Land Development, Stormwater Management Goals, and Growth Management Provisions in Place		

5.1.10 Traffic Noise

Introduction

In accordance with Title 23 Code of Federal Regulations Part 772, Procedures for Abatement of Highway Traffic Noise and Construction Noise (Title 23 CFR 772) and the North Carolina Department of Transportation Traffic Noise Policy, each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed State or Federal highway projects that construct a highway on new location, add new through lanes to an existing highway, substantially change the horizontal or vertical alignment of an existing highway, add or relocate interchange ramps or loops to complete an existing partial interchange, or involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots or toll plazas.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM®) approved by the Federal Highway Administration (FHWA) and following procedures detailed in Title 23 CFR 772, the NCDOT Traffic Noise Policy and the NCDOT Traffic Noise Manual. When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Construction noise impacts may occur if noise-sensitive receptors are in proximity to project construction activities. All reasonable efforts should be made to minimize exposure of noise sensitive areas to construction noise impacts.

The source of this traffic noise information is the *Traffic Noise Report, U.S. 1 Freeway Upgrade, STIP U-5307, Wake County* (ATCS, March 2022).

Traffic Noise Impacts and Noise Contours

The maximum number of receptors in each project alternative predicted to become impacted by future traffic noise is shown in the table below. **Table 5-6** includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA Noise Abatement Criteria or by a substantial increase in exterior noise levels as defined in the NCDOT Traffic Noise Policy.

Table 5-6. Predicted Traffic Noise Impacts by Alternatives

Alternative	Residential (NAC B)	Places of Worship/Schools, Parks, etc. (NAC C & D)	Businesses (NAC E)	Total
Build Condition 2040 (1)	182	7	4	193
Build Condition 2040 (2)	182	7	4	193
Build Condition 2040 (3)	177	7	4	188

**Per Traffic Noise Model (TNM) 2.5 and in accordance with 23 CFR Part 772*

Table 5-7. Predicted Traffic Noise Contour Distances

Area	Roadway Segment	Predicted Maximum Contour Approximate Distances (feet) From Edge of Pavement	
		66 dB(A)	71 dB(A)
1	U.S. 1 from Neuse River to Burlington Mills Road	200	<50
2	U.S. 1 from Height Lane to U.S. 1A (S Main Street)	270	170
3	U.S. 1 from N.C. 98 Bypass (Dr Calvin Jones Highway) to N.C. 98 Business (Durham Road)	300	150
4	U.S. 1 from Stadium Drive to Harris Road	250	150

Traffic Noise Abatement Measures

Measures for reducing or eliminating the traffic noise impacts were considered for all impacted receptors in each alternative. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers and noise insulation (NAC D only). For each of these measures, benefits versus allowable abatement quantity (reasonableness), engineering feasibility, effectiveness, and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for this project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and level of service of the proposed roadway. Costs to acquire buffer zones for impacted receptors will exceed the NCDOT base dollar value of \$22,500 per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Manual, causing this abatement measure to be unreasonable.

Noise Barriers

Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb and reflect highway traffic noise. For this project, earthen berms are not found to be a viable abatement measure because the additional right of way, materials and construction costs are estimated to exceed the NCDOT maximum allowable base quantity of 4,200 cubic yards per benefited receptor plus an incremental increase as defined in the NCDOT Traffic Noise Policy.

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by the FHWA. The following table summarizes the results of the evaluation.

Table 5-8. Preliminary Noise Barrier Evaluation Results

Alternative/ NSA	Noise Barrier Location Description	Length/ Height ¹ (feet)	Square Footage	Number of Benefited Receptors	Sq. Ft. per Benefited Receptor/ Allowable Sq Ft. per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely") for Construction ²
Alt. 1/ NSA 2	NW 2-1 U.S. 1 Northbound, North of Jacqueline Rd to South of Homestead Rd	941/15.8	14,865	10	1,487/1,500	Yes
Alt. 1/ NSA 5	NW 5-1 U.S. 1 Northbound, South of River Haven Pl to South of the Neuse River	1,234/17.6	21,721	43	505/1,500	Yes
Alt. 1/ NSA 8	NW 8-1A U.S. 1 Southbound, South of Burlington Mills Rd Extension to South of Circle Dr	696/16	11,156	3	3,719/2,000	No ⁴
Alt. 1/ NSA 8	NW 8-1B U.S. 1 Southbound, South of Burlington Mills	664/16	10,597	2	5,299/2,000	No ⁴

Alternative/ NSA	Noise Barrier Location Description	Length/ Height ¹ (feet)	Square Footage	Number of Benefited Receptors	Sq. Ft. per Benefited Receptor/ Allowable Sq Ft. per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely") for Construction ²
	Rd Extension to South of Circle Dr					
Alt. 1/ NSA 10	NW 10-1 U.S. 1 Northbound, South of Cliff Lane to North of Height Lane	1,392/14.5	20,113	14	1,437/1,500	Yes
Alt. 1/ NSA 11	NW 11-1A U.S. 1 Southbound, South of Ponderosa Park Drive to North of Poderosa Service Road	1,483/15.9	23,687	8	2,961/2,000	No ⁴
Alt. 1/ NSA 11	NW 11-1B U.S. 1 Southbound, South of Ponderosa Park Drive to North of Poderosa Service Road	1,260/13.3	16,700	6	2,783/2,000	No ⁴
Alt. 1/ NSA 14	NW 14-1 U.S. 1 Southbound, North of Common Oaks Drive to South of U.S. 1 On-Ramp from 98 Bypass	1,919/17.7	33,923	62	547/1,500	Yes
Alt. 1/ NSA 15	NW 15-1 U.S. 1 Northbound, Caveness Shoppes Drive to U.S. 1 Off-	2,279/17.5	39,914	38	1,050/1,500	Yes

Alternative/ NSA	Noise Barrier Location Description	Length/ Height ¹ (feet)	Square Footage	Number of Benefited Receptors	Sq. Ft. per Benefited Receptor/ Allowable Sq Ft. per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely") for Construction ²
	Ramp to 98 Bypass					
Alt. 1/ NSA 23	NW 23-1 U.S. 1 Southbound, South of Club Villas Drive to North of Country Club Drive	940/12	11,286	9	1,254/2,000	Yes
Alt. 1/ NSA 23	NW 23-2A U.S. 1 Southbound, North of Country Club Drive to North of Jenkins Road	1,026/11.7	12,078	2	6,039/2,000	No ³
Alt. 1/ NSA 23	NW 23-2B U.S. 1 Southbound, North of Country Club Drive to North of Jenkins Road	509/11.6	5,921	2	2,961/2,000	No ³
Alt. 1/ NSA 23	NW 23-3 U.S. 1 Southbound, North of Jenkins Road to South of Jenkins Road	1,034/15.3	15,864	2	7,932/2,000	No ³
Alt. 1/ NSA 24	NW 24-1 U.S. 1 Northbound, North of Stadium Club Road to South of U.S. 1	2,170/17.9	38,852	36	1,079/1,500	Yes

Alternative/ NSA	Noise Barrier Location Description	Length/ Height ¹ (feet)	Square Footage	Number of Benefited Receptors	Sq. Ft. per Benefited Receptor/ Allowable Sq Ft. per Benefited Receptor	Preliminarily Feasible and Reasonable ("Likely") for Construction ²
	Off-Ramp to Harris Road					

¹ Average wall height. Actual wall height at any given location may be higher or lower.

² The likelihood of a barrier's construction is preliminary and subject to change, pending completion of final design and the public involvement process.

³ Barrier is not feasible due to an inability to achieve a minimum of 5 dB(A) of noise reduction for at least two impacted receptors.

⁴ Barrier is not reasonable due to the quantity per benefited receptor exceeding the allowable quantity per benefited receptor OR Barrier is not reasonable due to an inability to achieve at least 7-dBA noise reduction for at least one benefited receptor.

Summary

A traffic noise evaluation was performed (March 2022) that identified seven noise barriers that preliminarily meet feasibility and reasonableness criteria found in the NCDOT Traffic Noise Policy¹⁴. A more detailed analysis will be completed during the project's final design. Noise barriers preliminarily found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis due to changes in proposed project alignment and other design considerations, surrounding land use development, or utility conflicts, among other factors. Conversely, noise barriers that preliminarily were not considered feasible and reasonable may meet the established criteria and be recommended for construction.

In accordance with NCDOT Traffic Noise Policy, the Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the anticipated Finding of No Significant Impact (FONSI). NCDOT strongly advocates the planning, design and construction of noise-compatible development and encourages its practice among planners, building officials, developers, and others.

¹⁴ The preliminary noise abatement locations can be found on the Public Meeting Maps included in **Appendix F**.

5.1.11 Air Quality

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The impact resulting from highway construction ranges from intensifying existing air pollution problems to improving the ambient air quality. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. Motor vehicles emit carbon monoxide (CO), nitrogen oxide (NO), hydrocarbons (HC), particulate matter (PM), sulfur dioxide (SO₂), and lead (Pb) (listed in order of decreasing emission rate).

The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These were established in order to protect public health, safety, and welfare from known or anticipated effects of air pollutants. The NAAQS contain criteria for SO₂, PM₁₀ (10-micron and smaller), PM_{2.5} (2.5 micron and smaller), CO, nitrogen dioxide (NO₂), ozone (O₃), and lead (Pb). Transportation conformity is required in areas designated nonattainment and maintenance by the U.S. Environmental Protection Agency (EPA) for the transportation-related criteria pollutants: ozone, particulate matter, nitrogen dioxide, and carbon monoxide.

The primary pollutants from motor vehicles are unburned hydrocarbons (HC), nitrogen oxides (NO_x), CO, and particulates. HC and NO_x can combine in a complex series of reactions catalyzed by sunlight to produce photochemical oxidants such as O₃ and NO₂. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources. These pollutants are regional problems.

Attainment Status and Transportation Conformity

The project is in Wake County, which is within the Raleigh-Durham-Chapel Hill nonattainment area for the prior 1997 ozone National Ambient Air Quality Standard (NAAQS) as defined by the EPA. This area was designated nonattainment for the 1997 8-hour ozone standard effective June 15, 2004. However, due to improved monitoring data, this area was redesignated maintenance on December 26, 2007. EPA approved a SIP revision for the removal of Federal low-reid vapor pressure requirement effective on February 3, 2014. The Raleigh-Durham-Chapel Hill area was attainment for the 2008 ozone NAAQS resulting in the 1997 ozone NAAQS being revoked on April 6, 2015. On February 16, 2018, the United States Court of Appeals for the District of Columbia Circuit in *South Coast Air Quality Mgmt. District v. EPA* ("South Coast II," 882 F.3d 1138) held that transportation conformity determinations must be made in areas that were either nonattainment or maintenance for the 1997 ozone NAAQS and attainment for the 2008 ozone NAAQS when the 1997 ozone NAAQS was revoked. Transportation conformity for plans and TIPs for the 1997 Ozone NAAQS can be demonstrated without a regional emissions analysis pursuant to 40 CFR 93.109(c). The Capital Area Metropolitan Planning Organization 2050 Metropolitan Transportation Plan (MTP) and the

2020-2029 Transportation Improvement Program (TIP) conform to the intent of the SIP. The USDOT made a conformity determination on the MTP on March 21, 2022, and the TIP on March 21, 2022. The current conformity determination is consistent with the final conformity rule found in 40 CFR Parts 51 and 93. There are no significant changes in the project's design concept or scope, as used in the conformity analyses.

Mobile Source Air Toxics (MSAT) and Greenhouse Gases (GHG)

NCDOT is conducting a quantitative analysis of MSAT and GHG for the Recommended Alternative using EPA's MOVES3 model. The analysis will be documented in a project-level air quality report and the results included in the anticipated FONSI.

Construction Air Quality

During construction of the proposed project, all materials resulting from clearing and grubbing, demolition or other operations will be removed from the project, burned, or otherwise disposed of by the Contractor. Any burning done will be done in accordance with applicable local laws and ordinances and regulations of the North Carolina SIP for air quality in compliance with 15A NCAC 2D.1900. Care will be taken to ensure burning will be done at the greatest distance practical from dwellings and not when atmospheric conditions are such as to create a hazard to the public. Burning will be performed under constant surveillance. Also, during construction, measures will be taken to reduce the dust generated by construction when the control of dust is necessary for the protection and comfort of motorists or area residents.

Air quality impacts resulting from roadway construction activities are typically not a concern when contractors utilize appropriate control measures. In North Carolina, contractors shall perform all construction activities with adequate control measures in place, e.g., watering exposed surfaces, covering or maintaining free board space on haul trucks, limiting vehicle speeds on unpaved roads, and minimizing equipment idling time. The temporary air quality impacts from construction are not expected to be significant.

5.1.12 Hazardous Materials

The information in this section is summarized from the *U-5307 GeoEnvironmental Phase I Report* (January 2021).

The GeoEnvironmental Section of the Geotechnical Engineering Unit performed a Phase I field investigation on December 10 and December 17, 2020, for the above referenced project to identify GeoEnvironmental sites of concern. The study was completed to document sites of concern within the project study area that are or may be contaminated. Sites of concern may include, but are not limited to, underground storage tank (UST) sites, dry cleaning facilities, hazardous waste sites, regulated landfills, and unregulated dumpsites.

Thirty-two (32) sites of concern were identified within the proposed study area, including:

- ❖ 19 sites with petroleum-related, UST concerns for which low to moderate monetary and scheduling impacts are anticipated.
- ❖ Three sites with dry-cleaning facilities for which moderate monetary and scheduling impacts are anticipated.
- ❖ Five Commercial sites, for which low to moderate monetary and scheduling impacts are anticipated.
- ❖ Five industrial sites, for which low to moderate monetary and scheduling impacts are anticipated. One of these sites is an anticipated superfund site: Parker Hannifin Brownfields Site. Moderate GeoEnvironmental impacts are anticipated as remediation system is located inside fenced off area. Review of documents are available through the regulatory database; contaminants include arsenic, chromium, cyanide, cis-1,2-dichloroethene.

NCDOT anticipates low to moderate monetary and scheduling impacts resulting from these sites. Note that Site 31, an active Just Tires automobile service location (12510 Capital Boulevard.), has five (5) active inground lifts, which will need to be removed prior to acquisition. The GeoEnvironmental Sites of Concern can be seen in **Figures 5-7 through Figure 5-9**.

Figure 5-7. GeoEnvironmental Sites of Concern (Figure 1 of 3 from Phase I Report)

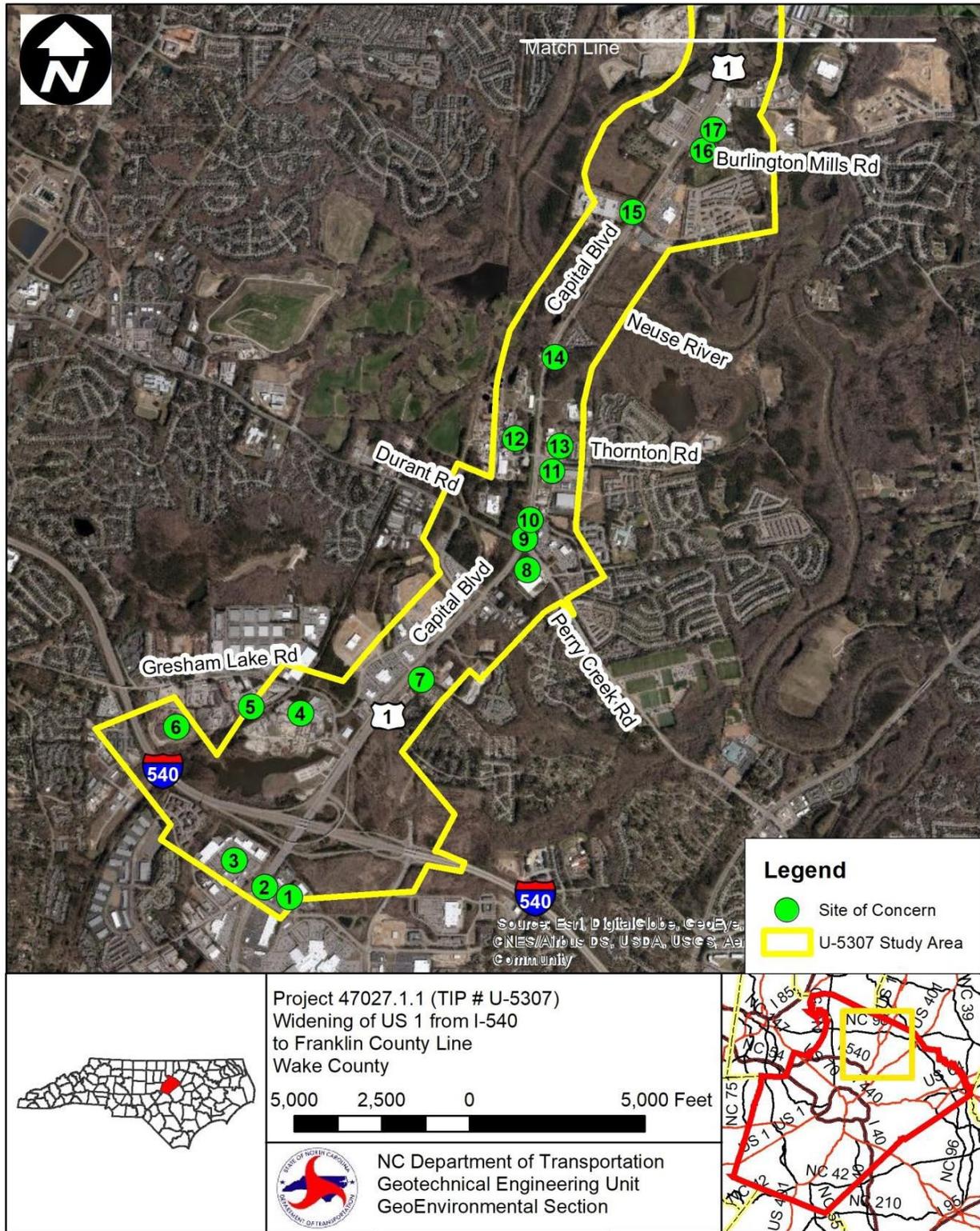
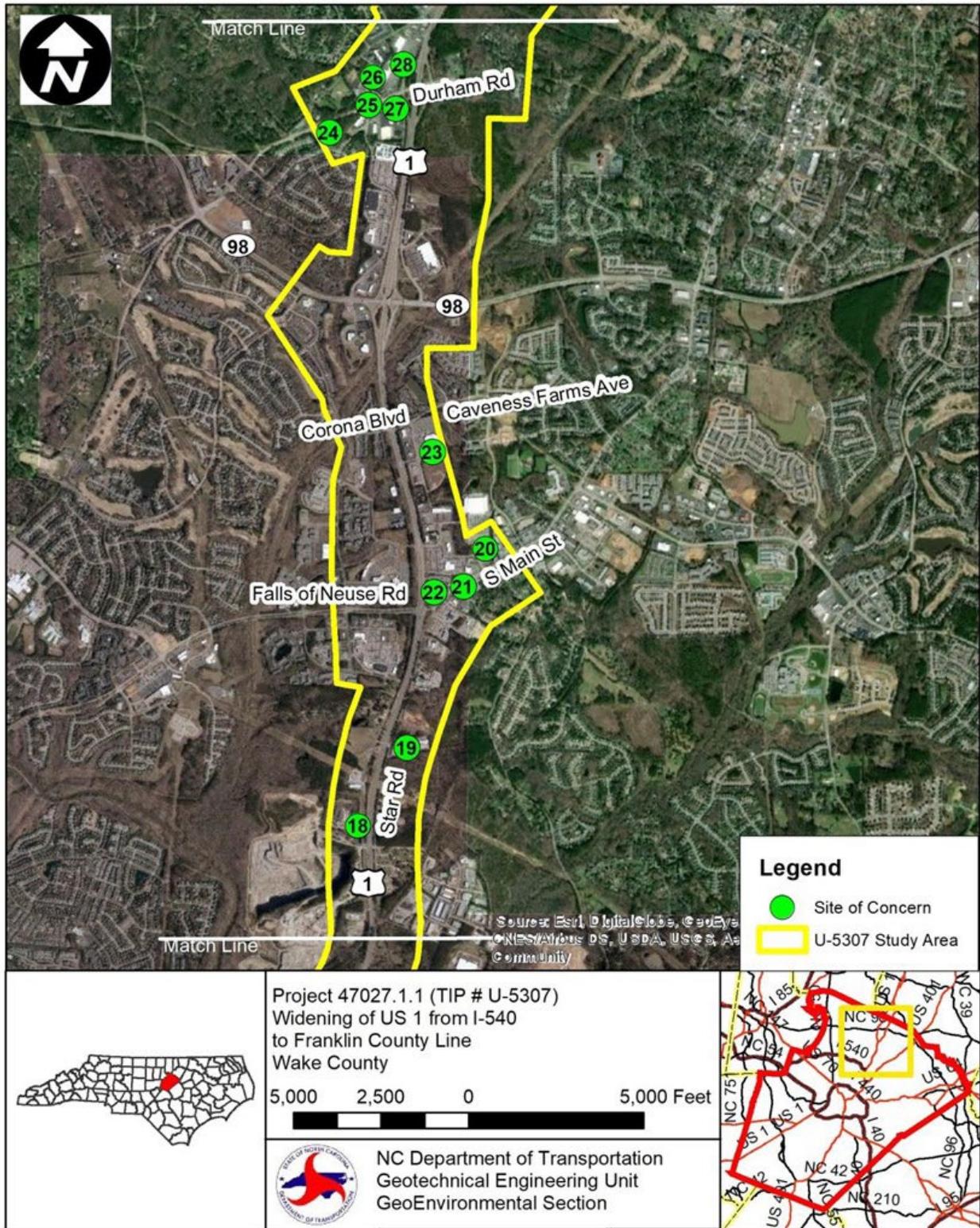


Figure 5-8. GeoEnvironmental Sites of Concern (Figure 2 of 3 from Phase I Report)



5.1.13 Flood Hazard Evaluation

The information in this section is summarized from the *U-5307 Hydraulic Planning Report* (June 2021).

The project is located within the Neuse River Basin. Coordination with the Federal Emergency Management Agency (FEMA) is anticipated on Sites 3, 4, 8 and 10 and are detailed in **Table 5-9**. In addition, a Conditional Letter of Map Revision (CLOMR) submittal is anticipated for Site 3 and a Memorandum of Agreement (MOA) will be required for Sites 4, 8 and 10 with a “no-rise”, Type 1 determination anticipated for all 3 sites.

Table 5-9. Flood Hazard Sites Requiring Additional FEMA Coordination

Site No.	Alternate ID	Station	Site Description
3	Gresham Lake Road	-Y9C- Sta. 52+00	Site 3 conveys flow from Perry Creek under the proposed Gresham Lake Road (-Y9C-) extension to Triangle Town Boulevard. Significant amounts of erosion were observed along both banks at the location of the proposed bridge crossing. The proposed major structure is a 300' reinforced concrete deck girder bridge.
4	Capital Boulevard	-L- Sta. 60+35	Site 4 is a reinforced concrete box culvert (910304) under U.S. 1 that conveys flow from Perry Creek. The existing culvert has 3 barrels at 8' wide and 8' in height. The culvert has a square edge top and side wingwalls at varying angles. Site 4 contains a gabion retaining wall on the downstream northernmost bank to prevent additional erosion issues. The local Antiques Vintage store owner acknowledged that water had over topped the banks and flooded into their parking lot during Hurricane Matthew in 2016. Division 5 Bridge Maintenance confirmed that Site 4 has poor alignment and downstream scour issues. Bridge Maintenance also indicated that the area floods but does not overtop the roadway and the structure will require preservation work. The Structure Safety Report dated 10/04/2018 gave the culvert a sufficiency rating of 58, with an assigned status of 'Structurally Deficient'.
8	Capital Boulevard	-L- 185+00	Site 8 conveys flow from Neuse River under U.S. 1. This site consists of existing dual reinforced concrete deck girder bridges (910305 and 910306) with varying span lengths. A Bridge Inspection Report dated 3/12/2014 gave bridge 910306 a sufficiency rating of 54, with an assigned status of 'Functionally Obsolete'. Bridge 910305 was given a sufficiency rating of 87, with an assigned status of 'Not Deficient'. Division 5 Bridge Maintenance confirmed that bridge 910306 would require preservation work. It was also stated that the site experiences high water levels but does not overtop.

Site No.	Alternate ID	Station	Site Description
10	Capital Boulevard	-L- Sta. 388+50	Site 10 includes a reinforced concrete box culvert (910672) under U.S. 1 that conveys flow from Richland Creek. The existing culvert has 4 barrels at 10' wide and 11' in height. The culvert has a square edge top and side wingwalls. Large amounts of drift were observed in front of the upstream barrels during the field investigation. The Structure Safety Report dated 08/08/2019 gave the culvert a sufficiency rating of 73. Division 5 Bridge Maintenance stated that the structure would require preservation work.

5.1.14 Overall Impact Summary

Table 5-10 through Table 5-13 provide a summary of the environmental impacts/consequences anticipated with construction of the project based on the current preliminary design. The impacts are divided into the four segments of the project, A-D and categorized into five sections: Section 404 Resources, Natural Environment Resources Impacts, Human Environment Resource Impacts, Right-of-Way Impacts, and Project Cost.

Table 5-10. Segment A Overall Impacts Summary

	Impact Category	Gresham Lake, Option 1	Gresham Lake, Option 2	Gresham Lake, Option 3	Gresham Lake, Option 4
Section 404 Resources	Wetlands Slope Stakes +25' (Slope Stakes only)	0.79 (0.56) acres	1.13 (0.89) acres	1.16 (0.86) acres	1.67 (0.97) acres
	Streams Slope Stakes +25' (Slope Stakes only)	3,873 (2,297) lft	4,687 (3,240) lft	4,532(2,764) lft	4,979 (3,474) lft
	Surface Waters Slope Stakes +25' (Slope Stakes only)	0.02 (0) acres	0.02 (0) acres	0.02 (0) acres	0.02 (0) acres
	Neuse River Basin Riparian Buffers – Zone 1 Slope Stakes +25' (Slope Stakes only)	242,292 (144,579) sq ft	281,761 (181,485) sq ft	272,343 (168,923) sq ft	298,607 (194,738) sq ft
	Neuse River Basin Riparian Buffers – Zone 2 Slope Stakes +25' (Slope Stakes only)	200,087 (111,078) sq ft	219,665 (132,473) sq ft	213,164 (130,325) sq ft	232,296 (142,570) sq ft
Natural Environment	100-Year Floodplain	0.5 acres	2.9 acres	0.5 acres	2.9 acres
	High Quality Waters	--	--	--	--
	Water Supply Watersheds	--	--	--	--
	Public Water Supply Wells (100' Buffer)	--	--	--	--
	Fed/State Threatened or Endangered Species Habitat Present	Yes	Yes	Yes	Yes
	Managed Areas	<0.1 acres	<0.1 acres	<0.1 acres	<0.1 acres
	Wildlife Refuges and Game Lands	--	--	--	--
Human Environment	GeoEnvironmental Sites of Concern (Phase I Report)	9 parcels	9 parcels	9 parcels	9 parcels
	Potential Noise Abatement Areas	1	1	1	1
	Notable EJ Presence	Minority, Low-Income, LA	Minority, Low-Income, LA	Minority, Low-Income, LA	Minority, Low-Income, LA
	Parks – Section 4(f)/6(f) Resources	--	--	--	--
	Other Recreational Resources/Wake County Open Space	0.4 acres	0.4 acres	0.4 acres	0.4 acres
	Cemeteries	--	--	--	--
	Places of Worship	1	1	2	1
	Schools (Public, Charter, & Private)	--	--	--	--
	Public Library	--	--	--	--
	Transit Routes/Stops	2 routes + 4 stops			
	Emergency Response Stations (EMS, Fire, Police)	--	--	--	--
	Historic Properties – Section 4(f)	--	--	--	--
ROW	Residential Displacements	4 (1 minority)	4 (1 minority)	4 (1 minority)	4 (1 minority)
	Commercial Displacements	11 (1 minority)	12 (1 minority)	11 (1 minority)	12 (1 minority)
	Non-Profit Displacements	1	1	1	1
Project Cost	Right-of-Way	\$86,236,107	\$90,730,107	\$89,234,107	\$93,728,107
	Utilities	\$16,601,230	\$17,412,082	\$18,113,902	\$18,924,754
	Construction	\$164,567,000	\$171,695,000	\$174,842,000	\$181,970,000
	Total	\$267,404,337	\$279,837,189	\$282,190,009	\$294,622,861

Table 5-11. Segment B Overall Impacts Summary

	Impact Category	Burlington Mills Road Option A with Pedestrian Bridge over the Neuse River	Burlington Mills Road Option B with Pedestrian Bridge over the Neuse River	Additional Impacts Associated with Full Y12A Service Road over the Neuse River
Section 404 Resources	Wetlands Slope Stakes +25' (Slope Stakes only)	0.94 (0.59) acres	0.95 (0.50) acres	N/A
	Streams Slope Stakes +25' (Slope Stakes only)	1,197 (833) lft	1,242 (847) lft	N/A
	Surface Waters Slope Stakes +25' (Slope Stakes only)	0.01 (0) acres	0.01 (0) acres	N/A
	Neuse River Basin Riparian Buffers – Zone 1 Slope Stakes +25' (Slope Stakes only)	80,502 (56,342) sq ft	76,724 (56,561) sq ft	N/A
	Neuse River Basin Riparian Buffers – Zone 2 Slope Stakes +25' (Slope Stakes only)	57,345 (39,897) sq ft	60,235 (40,690) sq ft	N/A
Natural Environment Resources	100-Year Floodplain	3.2 acres	3.2 acres	4.9 acres
	High Quality Waters	--	--	--
	Water Supply Watersheds	Critical = 0 acres Protected = 28.2 acres	Critical = 0 acres Protected = 17.4 acres	Critical = 0 acres Protected = 17.4 acres
	Public Water Supply Wells (100' Buffer)	5	5	5
	Fed/State Threatened or Endangered Species Habitat Present	Yes	Yes	Yes
	Managed Areas	0.1 acres	0.1 acres	2.4 acres
	Wildlife Refuges and Game Lands	--	--	--
Human Environment	GeoEnvironmental Sites of Concern (Phase I Report)	4 parcels	4 parcels	0 parcels
	Potential Noise Abatement Areas	1	1	--
	Notable EJ Presence	Minority, LA	Minority, LA	No Additional
	Parks – Section 4(f)/6(f) Resources	--	--	--
	Other Recreational Resources/Wake County Open Space	--	--	--
	Cemeteries	--	--	--
	Places of Worship	1	1	--
	Schools (Public, Charter, & Private)	--	--	--
	Public Library	--	--	--
	Transit Routes/Stops	1 route + 0 stops	1 route + 0 stops	--
	Emergency Response Stations (EMS, Fire, Police)	1 EMS Station	1 EMS Station	--
	Historic Properties – Section 4(f)	--	--	--
ROW	Residential Displacements	8 (1 minority)	18 (2 minority)	0
	Commercial Displacements	16	16	0
	Non-Profit Displacements	0	0	0
Project Cost (\$M)	Right-of-Way	\$74,549,130	\$47,255,969	+ \$71,000
	Utilities	\$8,775,919	\$7,064,997	+ \$0
	Construction	\$100,100,000	\$93,200,000	+\$1,807,000
	Total	\$183,425,049	\$147,520,966	+\$1,878,000

Table 5-12. Segment C Overall Impacts Summary

	Impact Category	Segment C
Section 404 Resources	Wetlands Slope Stakes +25' (Slope Stakes only)	0.66 (0.43) acres
	Streams Slope Stakes +25' (Slope Stakes only)	1,588 (620) lft
	Surface Waters Slope Stakes +25' (Slope Stakes only)	<0.01 (0) acres
	Neuse River Basin Riparian Buffers – Zone 1 Slope Stakes +25' (Slope Stakes only)	95,405 (46,894) sq ft
	Neuse River Basin Riparian Buffers – Zone 2 Slope Stakes +25' (Slope Stakes only)	60,837 (31,446) sq ft
Natural Environment Resources	100-Year Floodplain	0.6 acres
	High Quality Waters	--
	Water Supply Watersheds	Critical = 0 acres Protected = 3.1 acres
	Public Water Supply Wells (100' Buffer)	--
	Fed/State Threatened or Endangered Species Habitat Present	Yes
	Managed Areas	<0.1 acres
	Wildlife Refuges and Game Lands	--
Human Environment	GeoEnvironmental Sites of Concern (Phase I Report)	4 parcels
	Potential Noise Abatement Areas	3
	Notable EJ Presence	Language Assistance
	Parks – Section 4(f)/6(f) Resources	--
	Other Recreational Resources/Wake County Open Space	--
	Cemeteries	--
	Places of Worship	1
	Schools (Public, Charter, & Private)	--
	Public Library	--
	Transit Routes/Stops	4 routes + 1 stop
	Emergency Response Stations (EMS, Fire, Police)	--
	Historic Properties – Section 4(f)	Purefoy-Dunn Plantation, Powell House, CSX RR Bridge
	ROW	Residential Displacements
Commercial Displacements		0
Non-Profit Displacements		0
Project Cost (\$M)	Right-of-Way	\$28,124,000
	Utilities	\$6,530,960
	Construction	\$128,600,000
	Total	\$163,254,960

Table 5-13. Segment D Overall Impacts Summary

	Impact Category	Purnell Road/Harris Road Option 1	Purnell Road/Harris Road Option 2
Section 404 Resources	Wetlands Slope Stakes +25' (Slope Stakes only)	0.05 (0.04) acres	0.06 (0.05) acres
	Streams Slope Stakes +25' (Slope Stakes only)	1,443 (1,089) lft	1,392 (1,154) lft
	Surface Waters Slope Stakes +25' (Slope Stakes only)	0.87 (0.48) acres	1.17 (0.67) acres
	Neuse River Basin Riparian Buffers – Zone 1 Slope Stakes +25' (Slope Stakes only)	91,419 (66,556) sq ft	85,833 (61,936) sq ft
	Neuse River Basin Riparian Buffers – Zone 2 Slope Stakes +25' (Slope Stakes only)	61,764 (39,221) sq ft	51,164 (33,121) sq ft
Natural Environment Resources	100-Year Floodplain	--	--
	High Quality Waters	--	--
	Water Supply Watersheds	Critical = 0 acres Protected = 108.5 acres	Critical = 0 acres Protected = 98.4 acres
	Public Water Supply Wells (100' Buffer)	--	--
	Fed/State Threatened or Endangered Species Habitat Present	Yes	Yes
	Managed Areas	--	--
	Wildlife Refuges and Game Lands	--	--
Human Environment	GeoEnvironmental Sites of Concern (Phase I Report)	6 parcels	6 parcels
	Potential Noise Abatement Areas	2	2
	Notable EJ Presence	Low Income, Language Assistance	Low Income, Language Assistance
	Parks – Section 4(f)/6(f) Resources	--	--
	Other Recreational Resources/Wake County Open Space	--	--
	Cemeteries	1	1
	Places of Worship	3	3
	Schools (Public, Charter, & Private)	--	--
	Public Library	--	--
	Transit Routes/Stops	1 route + 0 stops	1 route + 0 stops
	Emergency Response Stations (EMS, Fire, Police)	1 EMS Station	1 EMS Station
	Historic Properties – Section 4(f)	Sutherland House	Sutherland House
	ROW	Residential Displacements	20 (4 minority)
Commercial Displacements		7	7
Non-Profit Displacements		0	0
Project Cost (\$M)	Right-of-Way	\$48,387,081	\$47,956,500
	Utilities	\$9,025,854	\$9,099,654
	Construction	\$110,300,000	\$109,000,000
	Total	\$167,712,935	\$166,056,154

6 Public Involvement, Agency, and Municipal Coordination

6.1 Public Meetings, Public Hearing, & Neighborhood Meetings

6.1.1 Public Meeting 1 (October 2018)

Public Meeting 1 was a series of two meetings, held October 9, 2018, (Raleigh) and October 29, 2018, (Wake Forest). NCDOT presented the general concept of widening U.S. 1 and the interchange concept designs. No service/connector roads were developed at this point. A total of 477 citizens attended the meetings. A total of 52 comments were received via comment forms at the Public Meetings with an additional 10 comments submitted via email and 100 through the project website.

Other conference calls were held with various small groups including the South Forest Business Park, Southeastern Baptist Theological Seminary, Duke Energy, Wake Forest Crossing Shopping Center, Celebration Church, and representatives for several property owners along the corridor. Extensive public involvement for the U.S. 1 Corridor Study was conducted prior to STIP Project U-5307 and is summarized on CAMPO's website.

6.1.2 Public Meeting 2 (December 2021)

Public Meeting 2 was a single meeting held in December 2021. The meeting was held virtually (via GoTo Meeting) due to COVID-19 limitations. Meeting materials included Public Meeting Maps (showing the current preliminary plans of widening of U.S. 1, interchange alternatives, and service/connector roads), handouts, project video, presentation, and an updated project website (<https://publicinput.com/Capital-Boulevard-Upgrade>).

Approximately 300 citizens participated (answered survey questions or asked questions) from the 3,000 plus website hits during this public outreach period. More than 200 new subscribers were added to the project email list.

Comments were fielded from citizens, developers, and municipalities and addressed in several rounds of communication as detailed below:

- ❖ Public Comments Received at the Public Meeting on December 9, 2021, and Public Comments Received During the Public Comment Period were compiled in comment response documents and are available on the project website and included as supplemental information in **Appendix F**
 - Comments were reviewed and categorized by location and/or topic (i.e., Schedule, Funding, Gresham Lake Road, Safety, etc.) and addressed in two (2) individual documents that were distributed to the project subscriber list.

- ❖ Property Specific Comments and Questions

- All other citizen comments and questions from the public meeting and public comment period were addressed individually via email and/or phone by April 19, 2022.

6.1.3 Circle Drive Neighborhood Meeting (November 2022)

A small group, neighborhood meeting was held on November 16, 2022, at Celebration Church (8700 Capital Boulevard) to address the residents along Circle Drive. The purpose of this meeting was to provide information on the U-5307 project, particularly with regards to the two proposed interchange options at Burlington Mills Road.

Both Burlington Mills Road interchange options are likely to have impacts to the residents along Circle Drive, with Option 1 (diamond) resulting in requiring a new entrance to the neighborhood and Option 2 (skewed partial cloverleaf) resulting in the displacement of all residents in this neighborhood. The Project Team presented the Public Meeting Maps from December 2021 and provided an overview of these scenarios, answered questions, and listened to comments and concerns of the residents. Residents were encouraged to share their thoughts in writing as well and provided comment forms for additional feedback.

Based on the feedback received at this meeting, the residents of Circle Drive overwhelmingly prefer Option 1 (diamond interchange) to Option 2 (partial cloverleaf interchange). Residents noted that many of them have lived along Circle Drive for a number of years, some their entire lives, with multiple generations of several families still present. Residents also noted hardships associated with relocating due to disabled children and elderly populations. The overall feelings shared were that this is a tight-knit cohesive community with substantial sentimental and (personal) historic value and not something that can be replaced.

6.1.4 Small Group Meetings

NCDOT has met with various small groups throughout the project development process in order to answer questions on the proposed project. Discussions generally include preliminary designs, potential impacts, and proposed private developments. When requested, NCDOT has shared design plans and data to help property owners and concerned parties plan in-sync with the U-5307 project. These discussions have included, but are not limited to, the South Forest Business Park, Southeastern Baptist Theological Seminary, Duke Energy, Wake Forest Crossing Shopping Center, Celebration Church, Casa de Su Presencia, Guerbet, Mallinckrodt, and representatives for several property owners along the corridor.

Casa de Su Presencia Small Group Meeting

Casa de Su Presencia is a Hispanic church located at 7129 Capital Boulevard which is adjacent to Gresham Lake Road and between Cheviot Hills Drive and Capital Hills Drive. The NCDOT Project Team met with church leaders and property owners on May 24, 2022, to discuss potential access impacts to this property. Upon concluding coordination, an acceptable, reasonable alternative access option was developed and would mitigate any potential relocation concerns for the church.

6.1.5 Municipal Coordination Meetings

Following Public Meeting 2, NCDOT received formal comments and/or resolutions from the City of Raleigh, Town of Wake Forest, U.S. 1 Council of Planning, and GoTriangle regarding the preliminary design presented at the Public Meeting.

To address concerns municipalities noted as significant impacts, NCDOT held meetings on September 1st and 13th, 2022, with the Town of Wake Forest and City of Raleigh, respectively (CAMPO staff attended both municipal meetings). The official resolutions were reviewed and stakeholders were engaged in discussions centered around, but not limited to, typical sections, number of lanes along U.S. 1 and service/connector roads, bicycle and pedestrian facilities, service/connector road connections, interchange locations and designs, U.S. 1 access, and traffic projections.

Following extensive coordination between the various groups within NCDOT, a second round of meetings was held with Town of Wake Forest, City of Raleigh, and CAMPO staff on February 2nd and 13th, 2023, to review final recommendations. These recommendations are included in the current design to be shown at the Public Hearing (June 2023). Four major project components that resulted from these coordination efforts are noted below (see **Appendix F** for a comprehensive municipal coordination memo documenting all coordination efforts):

- ❖ NCDOT will realign Gresham Lake Road and extend it across U.S. 1. The City of Raleigh is evaluating options for developer involvement to complete the connection to Triangle Town Boulevard and I-540.
- ❖ NCDOT will construct a bicycle/pedestrian bridge across the Neuse River east of the U.S. 1 mainline bridges to preserve multi-modal connectivity across the river and along the U.S. 1 corridor.
- ❖ Stroller Ridge Road will be extended and connect to Burlington Mills Road.
- ❖ Additional bicycle/pedestrian facilities throughout the project to comply with the NCDOT Complete Streets and municipal planning objectives.

6.1.6 Public Hearing

A Public Hearing is anticipated to be held in June 2023. All current alternatives will be presented for final public comments before determining the final Preferred Alternative Decision.

6.2 Online Outreach Efforts

6.2.1 Project Website

A project website (<https://www.ncdot.gov/projects/capital-boulevard-upgrade>) was developed in English and Spanish to keep the public informed about project details throughout the planning and development process. Information provided include the project description and schedule, purpose and need, Project Team contact information, educational information on various aspects of the project, alternative concepts, typical sections, specific areas of concern, progress status updates, and public involvement opportunities.

In anticipation of the 2021 public meeting, a new website was developed: <https://publicinput.com/Capital-Boulevard-Upgrade>. A PublicInput.com email (capital-boulevard-upgrade@publicinput.com) was created to capture email comments from the public. The Project Team has been responding to all project emails and providing information to the public.

The website also includes a Project Overview Video created for the 2021 public meetings. This video provides a summary of the proposed improvements.

6.2.2 Phone and Mail Contacts

A project mailing list was generated by the NCDOT Public Involvement Group prior to each public meeting. Additional contacts were added to the list with each phone call, letter, and email from the public. The up-to-date contact list was used for all public mailings during the project development process.

6.2.3 Phone Hotline

A hotline phone number ((984) 205-6615, code 3243) was set up to receive calls for this project. The Project Team has been responding to all project calls and providing information to the public.

6.2.4 Postcards/Newsletter

Postcards have been sent to the public notifying them of the 2018 and 2021 public meetings. A third postcard will be distributed ahead of the 2023 Public Hearing. Once the Preferred Alternative is selected, a final project newsletter informing the public of the preferred alternative will be distributed.

6.3 NEPA/404 Merger Process

This project was taken through the NCDOT's NEPA/Merger Process (see also [Section 1.4](#)). The sections below describe the concurrence points achieved so far through Merger Process with the regulatory partners. The signed concurrence forms are provided in **Appendix G**

6.3.1 Concurrence Point 1 – Purpose and Need, Study Area Defined (June 2018)

On June 14, 2018, the Merger Team met to discuss Purpose and Need and Study Area for the referenced project. During the meeting, existing conditions, the project study area, the project's need, and the project's purpose were presented. After the presentation and discussions, the NEPA/404 Merger Team reached a consensus and signed the formal Concurrence Point 1 Agreement. Under this agreement, the purpose and need of the project were defined as follows:

Need of Proposed Action

- ❖ Traffic congestion and trip time unreliability.

Purpose for Proposed Action

- ❖ Improve traffic congestion and travel times.
- ❖ Maintain regional mobility and local connectivity.

Study Area Defined

- ❖ The study area extends along U.S. 1 from I-540 to Purnell Road/Harris Road in Wake County, as shown on **Figure 1-1**.

6.3.2 Concurrence Point 2 – Detailed Study Alternatives Carried Forward (November 2018, April 2021)

On November 14, 2018, the Merger Team met to discuss Detailed Study Alternatives Carried Forward for the project. During the meeting, public comments from the October 2018 public meetings, proposed build alternatives, and stream and wetland impacts were presented. Following the presentation and discussions, the Merger Team reached a consensus and signed the formal CP 2 Agreement. Under this agreement, the following concept alternatives shown in **Table 6-1** along U.S. 1 were carried forward (see **Section 3.2.5** for concept details).

Table 6-1. Proposed Interchange Alternatives from CP 2 (Agreed to by Merger Team in 2019)

Location	Interchange Alternative
I-540 at U.S. 1	❖ Flyover with no Loop
Durant Road/Perry Creek Road at U.S. 1	❖ Diverging Diamond Interchange (DDI) ❖ Diamond Interchange
Burlington Mills Road at U.S. 1	❖ Diamond Interchange ❖ Diverging Diamond Interchange (DDI)
Falls of Neuse Road/U.S. 1A (South Main Street) at U.S. 1	❖ Diverging Diamond Interchange (DDI)
N.C. 98 Bypass at U.S. 1	❖ Ramp Improvements to Existing Interchange
N.C. 98 Business at U.S. 1	❖ Ramp/loop additions to Existing Interchange
Purnell Road/Harris Road at U.S. 1	❖ Partial Cloverleaf Interchange

In February 2020, the Project Team and key agency team members determined that an update to the CP 2 agreement would be necessary. The CP 2 revisions include five minor study area modifications, due to adding the preliminary service/connector road designs for connectivity, as well as revising the interchange type to carry forward at two previously agreed upon locations (U.S. 1 at Durant Road/Perry Creek Road and U.S. 1 at Burlington Mills Road).

On March 11, 2021, the Merger Team was sent a packet via email detailing the proposed revisions to the original CP 2 agreement. After corresponding with the agencies, the Merger Team reached a consensus and signed the formal revised CP 2 Agreement on April 15, 2021. Under this agreement, the revised study was defined and the following alternatives along U.S. 1 were carried forward (see [Section 3.2.5](#)).

General Improvements:

- ❖ U.S. 1 mainline – No change from CP 2 signed in 2019.
 - Conversion to a controlled-access highway; best fit alignment for centerline with consideration for maintenance of traffic during construction.
- ❖ Service/connector Roads – No change from CP 2 signed in 2019.
 - Service roads and connecting streets are under study to maintain regional mobility and local connectivity and will be presented at Concurrence Point 2A. The Project Team is considering a combination of existing streets and new location.
- ❖ Interchange Modifications – No change from CP 2 signed in 2019.
 - I-540 – Studying a flyover carrying southbound U.S. 1 traffic to eastbound I-540.
 - N.C. 98 Bypass (Existing single-point urban interchange) – Studying potential ramp improvements.
 - N.C. 98 Business (Existing diamond interchange) – Studying potential ramp and loop additions.
- ❖ Grade Separation at Stadium Drive/Jenkins Road – No change from CP 2 signed in 2019.
 - An interchange is not proposed at this location at this time, but the Project Team is working with stakeholders not to preclude possible future improvements by others.
- ❖ I-540 Westbound Lane Addition – No change from CP 2 signed in 2019.
 - Between Triangle Town Boulevard Interchange and the U.S. 1 southbound on-ramp at I-540.
- ❖ New Interchanges – change shown in **Table 6-2**.

Table 6-2. Proposed Interchange Alternatives from CP 2 Revised (Agreed to by Merger Team in 2021)

Location	Proposed/Revised Interchange Alternative
Durant Road/Perry Creek Road at U.S. 1	❖ Minimized Diverging Diamond (DDI)
Burlington Mills Road at U.S. 1	❖ Diamond ❖ Skewed Partial Cloverleaf ¹⁵
Falls of Neuse Road/U.S. 1A (South Main Street) at U.S. 1	❖ Diverging Diamond (DDI) (no change)
Purnell Road/Harris Road at U.S. 1	❖ Partial Cloverleaf (no change)

¹⁵ This option was added between the CP 2 meeting (November 2018) and the Revised CP 2 meeting (April 2021).

6.3.3 Concurrence Point 2A – Bridging Decisions and Alignment Review (November 2021)

On August 18, 2021, the Merger Team met to discuss bridging recommendations and alignment review. During this meeting, the Merger Team reached a consensus and signed the formal CP 2A Agreement on November 11, 2021. Under this agreement, the crossings shown in **Table 6-3** were agreed to.

Table 6-3. Bridging Decisions from CP 2A

Site #	Stream or Feature/ Crossing Roadway	Existing	Proposed Structure	Wetland Impacts (acres)	Stream Impacts (lf)
1	UT to Perry Creek/I-540	72" RCP	Retain existing	0.1	70
2	UT to Perry Creek/I-540	2 @ 8' x 6' RCBC	Retain existing and add 72" supp. pipe	0	180
3	Perry Creek/Gresham Lake Road Extension	N/A	300' bridge	0	260
4	Perry Creek/U.S. 1	3 @ 8' x 8' RCBC	Retain and extend existing; add 84" supp. pipe	0	190
5	UT near Neuse/U.S. 1	2 @ 8' x 8' RCBC	Retain existing and add 84" supp. pipe	0	100
6	UT near Neuse/ Y10 (Service Road)	N/A	48'W x 60'L bridge	0	120
7	UT near Neuse/ Y10 (Service Road)	N/A	1 @ 6' x 7' RCBC with a notched sill	0.1	300
8	Neuse River/U.S. 1	Dual 250' bridges	345' dual bridges and service road bridge	0	430
9	UT to Smith Creek/Y18 (Star Road Extension/Service Road)	N/A	1 @ 7' x 8' RCBC	0.6	810
10	Richland Creek/U.S. 1	4 @ 10' x 11' RCBC	Retain and extend existing RCBC and 72" supp. pipes	0	160
11	UT near Neuse/Driveway	N/A	DELETED	N/A	N/A
12	U.S. 1 over CSX Rail Line (eligible for NR)	Dual bridges carrying U.S. 1	300' dual bridges and service road bridge	0	0
Total				0.8	2,620

6.3.4 Concurrence Informational Meeting (December 2022)

Because of the amount of time that had passed since the last Merger Meeting in 2021, the Merger Team met on December 15, 2022. The meeting was held as an update meeting only. No decisions were made, and no concurrence was requested during the meeting.

During this meeting, the Merger Team reviewed: updated alternatives, including service/connector road alignments (shown at the December 2021 Public Meeting), public outreach, traffic operations updates, Neuse River Crossings update, and Wake Union Church Road Extension.

6.3.5 Concurrence Point 3 – LEDPA/Preferred Alternative Selection

The Merger Team will meet to select the LEDPA (Least Environmentally Damaging Practicable Alternative) after the signing of this Environmental Assessment and the Public Hearing.

6.3.6 Concurrence Point 4A – Avoidance and Minimization

Avoidance and minimization have been documented through the NEPA process and discussed at each Merger Meeting. The Merger Team will document past efforts and decide any additional avoidance and minimization efforts once the LEDPA is determined.